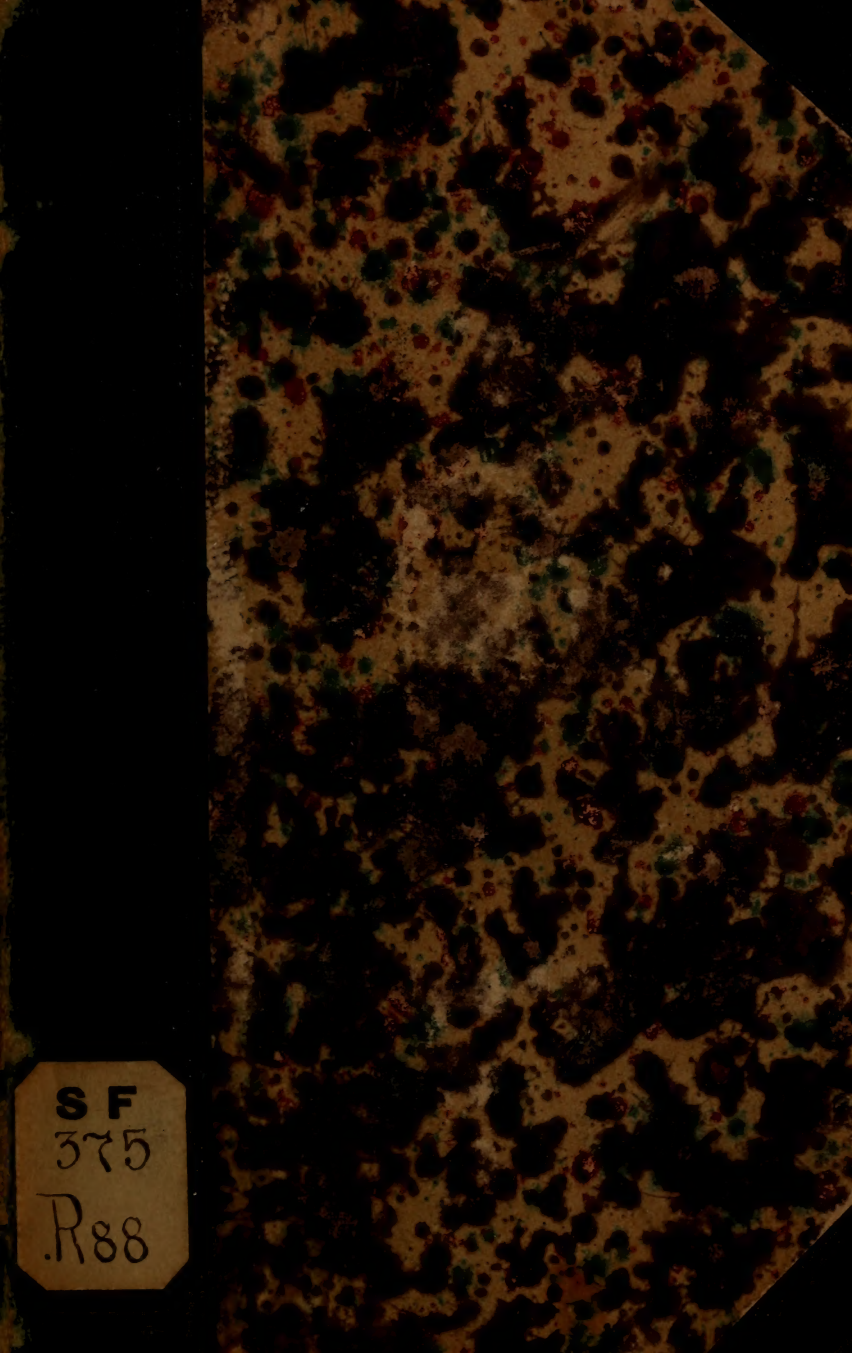


THE SAN FRANCISCO WOOLEN FACTORY.—(Black Point.) See page 127.

THE

SHEEP BREEDER'S GUIDE;

BEING A

TREATISE ON THE GENERAL MANAGEMENT AND BREEDING OF

SHEEP,

DESCRIBING THE VARIETIES BEST ADAPTED TO THE DIFFERENT SOILS AND CLIMATES OF CALIFORNIA, OREGON AND WASHINGTON TERRITORY;

WITH DIRECTIONS HOW TO IMPROVE THE EXISTING BREEDS IN THE MOST ECONOMICAL MANNER, SO AS TO OBTAIN A FINE WOOLED RACE ESPECIALLY ADAPTED TO THE REQUIREMENTS OF THE STATES AND TERRITORY ON THE PACIFIC COAST BELONGING TO THE UNITED STATES.

BY THOMAS ROWLANDSON,

Author of the following Essays, which obtained Prizes from the Royal Agricultural Society of England:

$100	The Breeds of Sheep best adapted to different localities,	$100	The Culture of Hemp,
100	The Breeding and Management of Pigs,	75	On Top-Dressing Soils,
250	Farming of North Wales,	50	Burning Land for Manure,
250	Farming of Herefordshire,	50	The Making and Management of Butter, etc., etc.

"Wherever the foot of the Sheep touches, the land is turned into gold."

[*Old Spanish Proverb.*

J. Q. A. WARREN,
AGRICULTURAL BOOK PUBLISHER,
No. 511 Montgomery Street.
SAN FRANCISCO.

1861.

AGNEW & DEFFEBACH, PRINTERS,
No. 511 Sansome Street, corner Merchant.

PUBLISHER'S NOTICE.

Owing to the extensive connection, which the publisher possesses, with all classes of Agriculturists and Stock Raisers in California, Oregon and Washington Territory, he has had the opportunity of ascertaining from various sources the more immediate wants which exist, in countries so recently occupied, to any extent, as the above mentioned. No *want* appears so great in importance, as some reliable work on "Sheep Husbandry," as adapted to the climate and soils of the Pacific Coast. Sheep culture and wool growing will probably become, eventually, one of the most important interests in California. Many reasons, however, have deterred the publisher from undertaking the publication of a work of this character. The heavy cost of publishing, on the Pacific Coast, as compared with the Eastern States, was one reason—another, and perhaps more important one, was the difficulty of obtaining an individual who possessed such a practical knowledge of the different matters connected with the subject, as would not only entitle his remarks to respectful attention, but be of permanent value to the persons engaged in the business of sheeep farming.

Mr. Rowlandson, the author of this work, is a gentleman who is held in high esteem, in England, for his general Agricultural qualifications, but especially on this subject, the best proof of which is, that he had awarded to him the prize of $100, given by the Royal

Agricultural Society of England, for the best Essay on "*The Breeds of Sheep best adapted to different localities.*" Mr. R.'s capabilities have been further certified by the present Speaker of the English House of Commons, (himself an Agricultural author of some eminence,) many Noblemen, Agricultural, Veterinary and Chemical Professors, Members of Parliament, Eminent Agriculturists and Agricultural writers—a copy of which, to such as may feel interested, may be seen by calling on the publisher. Under such circumstances, the publisher thought he felt justified in printing a limited number of copies of a work on "Sheep Husbandry," at a price that would come within the reach of every one, believing that by so doing he would meet with a liberal amount of patronage, from those engaged in California Agriculture, as would, at all events, secure him from loss.

Having made these observations, he respectfully submits the Work (the first issued in California on the subject) to the liberal criticism and patronage of his esteemed friends, the *Farmers of California*—to whom the subscriber takes the opportunity of returning his sincere thanks for past favors, and hopes, by careful attention, to merit its continuance.

J. Q. A. WARREN.

San Francisco, August, 1861.

AUTHOR'S PREFACE.

Mr. Warren, the publisher of this work, mentioned to the author that a general desire existed among the Farmers of California, that he (Mr. W.) should publish a work on Sheep Farming, suggesting the best modes of rearing and the best breeds adapted for the States and Territories of the United States bordering on the Pacific. Mr. W., at the same time, requesting me to undertake the authorship of such a work. The terms for doing this having been satisfactority settled, the task was undertaken.

In laying this small volume before the public of the North Pacific, the author feels that he may fairly lay claim to a considerable amount of indulgence for its incomplete state, many points of management being entirely omitted, or much curtailed—as it was felt that to allude to them in a mutilated manner would only be productive of error, whilst to give a detailed account would, in a majority of cases, be considered unnecessarily tedious. Some of the points omitted and reduced, required also expensive cuts, in order to render the printed matter sufficiently explanatory; this particularly applies to the chapters relating to teething and parturition—very important subjects, certainly, but respecting which, it is assumed, that each sheep owner knows something practically, or has a shepherd or neighbor who can be called upon to afford the requisite advice and assistance. Not only cuts, but printing and paper are more expensive in California than in the Eastern States, so much so, that there was no possibility of publishing a large book here on such terms as would obtain a remunerating sale in the East. In one respect, perhaps, a work abounding in the most minute details is more required in California than in any place, because in no other country are there so many persons engaged in sheep farming who had previously been occupied at the anvil, the

bench, other handicraft, or commercial pursuits, who have had no knowledge of the business until they embarked their capital therein. Many such, from mistaken views and limited knowledge, complain at the present time of the great depreciation in the value of their property, owing to the low price of mutton. The wool of Mexican sheep in the south is now valueless to the proprietor, the fleece being given to the shearer for his labor ; with sheep possessing a more valuable wool, the case would have been reversed—the loss turned into gain.

It appeared, under all circumstances, preferable to dismiss as much as possible minute details of practice, and lay before the reader general principles. In doing so, there was this advantage—that a more than usual portion of the anticipated readers, from causes already noticed, are not likely to have their minds prejudiced by long fixed opinions, which is generally, amongst agriculturists, the great barrier to improvement. Practice is undoubtedly better than theory, and the instances known to me are numerous where practices are, or rather appear, occasionally to controvert known general laws, until a further step in scientific discovery reconciles the discrepancy. The author, neither in his former essays and treaties or on the present occasion, has done other than pay a proper respect to well-established rules, founded on local or general experience.

In laying the foundation for the future success of sheep farming in California, Oregon and Washington Terrritory, no ancient practices exist as guides, whilst with regard to copying rules available in England and Germany, so dissimilar are the climate, vegetation, expense of labor, &c., that no parallel can be advantageously drawn. For these reasons the author confined himself as much as possible to general rules, founded on the instances detailed throughout the body of the work, leaving the reader to judge for himself as to the adaptability of any of the described breeds for his own locality.

With these prefatory remarks, the author respectfully leaves the work, as he hopes, to the unbiased criticism of his readers.

THOMAS ROWLANDSON.

San Francisco, August, 1861.

CHAPTER I.

THE ZOOLOGICAL CHARACTER OF SHEEP.—Its Names according to Age —The marks by which its age may be known—The Teeth—Natural Age.

Sheep belong to the order Ruminantiæ, or those animals that chew the cud, to the tribe CAPRIDÆ, and genus Ovis. Of the *Ovis* there are three varieties—the OVIS AMNON, or ARGALI, the OVIS MUSMON, and the OVIS ARIES, or domestic sheep. It is only the last variety with which the California sheep farmer feels economically interested. There are many points of resemblance between the goat and sheep, and it would be difficult to mark out any distinct external appearance found in the one that cannot be more or less discovered in the other. Spiral and curved horns are found in varieties of each genus, wool and hair also. As a general rule, however, wool predominates in the sheep and hair with the goat; nor am I aware that goats' wool, such as the Thibitian kind, possesses any sensible felting qualities; in fact, it is to the absence of this felting quality that the fine Cashmere shawls owe the property of maintaining their unrivalled fineness, though in constant use; other shawls made from sheeps' wool thickening—that is felting—by continuous wear. With the exception of cases of scientific, but of no practical consequence, the difference in appearance between sheep

and goats is sufficiently obvious to the most casual observer.

NAMES GIVEN TO SHEEP ACCORDING TO SEX AND AGE.

The male is called a ram or tup, unless castrated, after which it is usually termed a wether, though in many parts of the south of England the word "teg" is employed for the same purpose; and on the borders of England and Scotland "dinmont" is also used. The general name employed when intending to describe the castrated male sheep is the word wether. In the United States the word "buck" has become very prevalent when alluding to male sheep that have not been castrated, though I believe not extended further as a distinctive appellation than as describing lambs as buck lambs. It would be well if sheep-masters would agree to adopt the most ancient names, such as ram and wether. Whilst with the mother both sexes receive the generic title lamb, and if a more distinctive one is desired the male animals are described as ram lambs or tup lambs. From weaning until shearing time it is often called a hog, a hogett, a hoggerell, a lamb hog, a tup hog, or a teg; and if castrated, a wether hog. After shearing, when the animal probably will be on an average of cases sixteen months old, he has received the names of a shearling, a shear-hog, &c., and a shearling wether, &c., when castrated. After the second shearing he is called a two-shear ram or tup, or wether; at the expiration of another year he is called a three-shear ram, &c., the name always taking its date from the time of shearing.

It would be of no practical advantage to extend the enumeration into further English provincialisms.

The female is called a ewe or gimmer-lamb until weaned, after which a gimmer hog, or ewe hog, or teg. After being shorn she is a shearling ewe or gimmer; afterwards is known as a *two-shear*, a *three-shear*, or a *four* or a *six-toothed ewe*. The last being sometimes called a *theave*.

THE AGE OF SHEEP—THE TEETH.

It has already been stated that the age of sheep is usually reckoned from the time of shearing; when, however, a doubt exists on the subject, recourse is had to an examination of the teeth. Sheep have no incisor teeth on the front part of the upper jaw, the bars or ridges of the palate thicken as they approach the fore part of the mouth; there also the dense, fibrous, elastic matter of which they are constituted becomes condensed, and forms a cushion or bed that covers the front of the upper jaw, and occupies the place of the upper incisor or cutting teeth, and in part discharges their functions; the herbage being firmly held between the front teeth in the lower jaw and this pad, is partly bitten and partly torn away. The rolling motion of the head whilst the animal is feeding, affords an evidence of this tearing action.

The molar teeth in sheep are the same in number as those of the ox, namely, six above and below and on each side. Sheep when arrived at full growth, which is usually during the fifth year, possess eight incisor teeth

in the lower jaw, or what is called full mouthed. Sheep are close feeders, and are enabled to shave the grass near to the roots. It is the better enabled to do this owing to the upper lip being deeply divided, and near the centre free from hairs. That part of the tooth above the gum is not only, as in other animals, covered with enamel, to enable it to bear and preserve a sharpened edge, but the enamel on the upper part rises from the bone of the tooth nearly a quarter of an inch, presenting a convex surface outward and a concave within, thus forming a little scoop or gouge. From these circumstances the sheep is better adapted for grazing than the ox, and can grow fat where an ox would starve.

The lamb is usually born before any of the temporary teeth—incisors or molars—have penetrated the gums. Generally, however, the first and several pairs of temporary incisors, the four teeth most centrally situated, are cut by the time the lamb is a week old. By the ninth or tenth day the third pair usually comes through, but the fourth or last pair is rarely put up until about the end of the fourth or beginning of the fifth week. The temporary molars, or grinders as they are commonly called, three in number on either side of the upper and lower jaw, though uncut at birth, are fairly through the gums by the time the animal is three weeks old.

A marked difference exists with regard to the relative sizes of the different pairs of incisors.* The central teeth are broader and longer than the second pair, which also exceeds the third, as the third does the

* Front or cutting teeth.

fourth. In these particulars, as in several others, the temporary incisors are the counterparts of the permanent, which succeed them. They are, however, very much smaller than the permanent.

The number of both the temporary and permanent sets of teeth of the sheep is the same as in the ox. The temporary incisors are eight, the temporary molars twelve, and when dentition is perfected by the changing of these teeth and the putting up of twelve more molars, the total number in both animals is thirty-two, namely, eight incisors or cutting teeth, and twenty-four molars or grinders. The temporary molars are likewise similar in form to the permanent, although smaller, excepting the third molar of the lower jaw, which, like the corresponding temporary tooth of the ox and pig, is composed of three principal parts or lobes blended together. About the third week of the lamb's age both incisors and molars are so well developed as to enable the young animal to crop the grass and live comparatively independent of its dam.

From one month until about three months no change of consequence takes place in either the incisors or the molars. At this time, rather before than afterwards, the lamb cuts its *first permanent* molar teeth, the fourth in situation. These teeth, as in the calf, are usually more forward in the lower than in the upper jaw, and possessing but two lobes, are scarcely so long from front to back in the lower jaw as the temporary molars which

stand before them. With this addition the lamb has by this time sixteen molars.

The next important stage in the process of teething in sheep is the cutting of the molars-*fifth* in position. This takes place when the animal has reached his *ninth* month, and consequently forms a useful criterion to assist in determining a question of age, both before and after this date. The molars are now twenty, which added to the incisors, gives a total of twenty-eight teeth.

At nine months the incisors offer but few facilities for ascertaining the animal's age. In most cases they will have reached their full development; and in some few, when the sheep have pastured on tough herbage, especially if intermixed with sand, will begin to give evidence of slight wear. Both the fourth and fifth molar teeth consist of two main parts or lobes blended together. The animal now passes nine months of his life without any addition being made to the *number* of his teeth, the sixth molar not coming up until he is eighteen months old.

At a year old, in cases not unfrequent of early teething sheep, they cut the *first pair of permanent* incisors. Cotswold sheep, as a rule, have their first permanent teeth before either Southdowns, Shropshires, or Hampshiredowns. Leicesters closely follow the Cotswold in early teething- In a majority of cases, however, sheep do not cut these teeth until they are about fifteen months old. At eighteen months most sheep will cut the *sixth* molar tooth.

As with the first pair of "broad teeth," so with the second; many sheep do not put them up until three months after others. A *year and three-quarters* is the average time when sheep will cut their second pair of incisors. But instances are not wanting of sheep being nearly two years old before these teeth are in the mouth.

From a number of observations of early teething, it has been found that the earliest appearance of six permanent incisors occurred at two years and a quarter. The third pair of permanent teeth does not, even in sheep of *early dentition*, succeed in the same time as those teeth did the first—there being *six* months only between the cutting of the first and the second pair, but nine between the second and third. In sheep of *late* dentition, the *second* pair of permanent incisors is not in the mouth till two years; and in these animals the third pair is sometimes not cut until about two years and three-quarters.

Another *nine* months will sometimes elapse between the cutting of the third and the fourth pair. During this period, from daily attrition, the four central teeth will give increased evidence of wear. They will, in many instances, be flat on their surface, or it may be that this is worn into hollows.

The fourth pair of permanent incisors succeed the third at an interval of about nine months, which bring the sheep of early dentition to *three years*, and those of late dentition to *three years and six months*. It is not, however, to be assumed that all sheep will be "full

mouthed" even at three years and a half; there are exceptions, for greater regularity attends the time of cutting the fourth than any of the preceding pairs. Allowing for occasional cases where these teeth are not in the mouth until four years of age, it will be seen that even in those late exceptions just noticed, the dentition of sheep is completed a year before the time accorded to it by Youatt and other writers who have written on the subject. It is with regret that I have been compelled to abreviate these valuable observations of Professor Simmonds to so large an extent. Condensed as it is, however, I believe it is the most copious and correct account of ovine dentition which has appeared in any work upon sheep.

DENTITION OF THE SHEEP.

Table of early Dentition.

Years.	Months.	
1	0.	Central pair of temporary incisors replaced by permanent.
1	6.	Second pair replaced by permanent.
2	3.	Third pair " " "
3	0.	Fourth pair " " "

Table of late Dentition.

Years.	Months.	
1	4.	Two permanent incisors.
2	0.	Four " "
2	9.	Six " "
3	6.	Eight " "

In examining sheep, there will frequently be very considerable difference, on comparing the teeth of the

FIGURE 1.

Lambs full mouth—temporary incissor teeth.

FIGURE 2.

Appearance of the first pair of permanent incissors, which appear at the age of from 12 to 16 months.

FIGURE 3.

Second pair of permanent incissors, which appear at the age of from 18 months to 2 years.

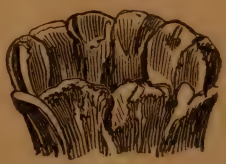
FIGURE 4.

Third pair of permanent incissors, which appear at the age of from 2 years and 3 months to 2 years and 9 months.

FIGURE 5.

Fourth pair of permanent incissors, (or full mouthed,) which appear at the age of from 3 years to 3 years and 6 months.

FIGURE 6.



Example of displacement calculated to deceive, unless carefully examined.

hogs, or the one shear; this may be accounted for in several ways, as difference in the period of lambing, as also to the natural stamina and vigor of the animal, especially if of a forward breed and highly fed; owing to the latter cause alone a difference of a most marked character between the forward or backward appearance of the teeth in whole flocks may be observed, accordingly as they have received good and abundant feed, or been stinted to poor food.

The want of improvement observed sometimes in sheep, without any variation having taken place in the pasturage, arises from the animal being unable to obtain her ordinary amount of food in consequence of the inflamed state of the jaw, whilst the permanent teeth are protruding through the gums. It would be well if such are observed, to have ready some carrots, potatoes or other roots, sliced and mixed with bran or cut hay, in order to enable the animal to hold his own until the teething fever has passed.

The careless examiner may sometimes be deceived with regard to the three-year old mouth. The teeth may appear perfectly developed, no diminutive ones at the sides, and the mouth apparently full, and if the teeth are not counted, the observer will probably conclude that the sheep is four years old. In such cases a process of displacement and of diminution have taken place; the outside milk teeth are not only shrunk to less than a fourth part of their original size, but the three-year old teeth may have grown before them, and

so perfectly conceal them, unless the mouth is completely opened. Figure 6 represents this deceptive appearance.

After the permanent teeth have all appeared and are perfectly grown, there exists no criterion as to the age of sheep. In most cases the teeth of sheep remain sound according to circumstances, for about a couple of years after becoming full-mouthed, after which at uncertain intervals, whether from the effects of age or having to feed on hard, tough pasturage, especially when much sand is intermixed with the pasturage, the teeth become worn down to the gums; or in cases where there is a deficiency, if carbonate and phosphate of lime in the food, they break off owing to natural slenderness, or occasionally from the effects of age they loosen and fall out. When therefore favorite ewes that have been kept for breeding, begin at six or seven years old to lose condition, their mouths should be carefully examined. If any of the teeth are loose, they should be extracted, and a chance given to the animal to show how far, by browsing early and late, she may be able to make up for her diminished number of incisors. It sometimes happens that ewes with broken teeth, some even with all the incisors gone, will keep themselves in condition equal to the soundest of the flock; such have, however, to be well taken care of during the winter—indeed, requiring an extent of care which would only be justified on rare occasions with very fine animals from which I expected to obtain an exceedingly valuable progeny.

When sheep get much older than six years, it loses not only much of its property to fatten, but the wool also declines. This remark more especially applies to very high bred sheep. The kinds which nearest approach to a natural or wild state, such as the Herdwicks, I have known to produce lambs after they were fifteen years of age, and occasionally living to beyond twenty. The natural age of sheep is usually estimated at ten years ; to which age, if properly kept, they will generally breed and thrive well.

CHAPTER II.

CLIMATE AS AN ELEMENT IN SHEEP CULTURE.—Northern zone, within which Sheep flourished best—Cause of abandonment of the growth of fine wool in England—Requisites for the growth of fine Wool—Periodical scarcity of food—Fine wooled Sheep best adapted to warm climates, whether wet or dry; long, open-wooled breeds to wet climates—Effects of climate on pasturage, and cultivated food—Wider provision requisite and improved management required, if improved breeds are to become general in California—Special adaptability of race for special localities acquired by time—Peculiarity of character the result of irregularity of feeding, when Sheep are left in the natural state.

Of all the subjects connected with sheep grazing, whether considered as regards its direct or indirect action, no one is of so great importance as climate. This matter will be considered under two points of view, namely, the immediate action of climate upon the animal, chiefly affecting the skin in the first place, and subsequently by sympathy the other organs and animal functions. The secondary one is perhaps of the greatest economical importance, and relates to the supply of food as dependent upon climate. For to a certain extent, abundance of food, possessed of a nutritious character, will compensate in degree for inclemency of climate ; to derive this advantage, however, it in the first place is requisite that the animal becomes acclimatized to the changed condition in which it is placed, otherwise most serious evils will arise.

Perhaps no tribe of animals possess so cosmopolitan a character as the Capridæ, the goat from which

the tribe has derived its name, possessing, in this respect, a wider range of adaptability to circumstances, than sheep. Nevertheless sheep are spread over a most extended portion of the earth's surface, being found from the equator to the icy circle, and from the level of the sea to an elevation only a little below the region of perpetual snow. It is not one of the least excellent properties of this truly valuable animal, that it possesses a constitutional adaptability for living under such a wide range of climatic changes, but also the property of maintaining itself on pasturage greatly dissimilar.

Notwithstanding sheep live within the torrid zone, and also within the arctic circle, it will be found in each case that the general form of the animal becomes changed, as compared with those occupying the temperate regions of the earth. The most marked change displays itself in the wooly covering. In the equatorial regions, the fine fleecy wool becomes converted into hair, like that of goats, without any undergrowth of wool; whilst in the colder regions that part of the wool is converted into hair, (kemps,) intermixed with long, straight hair-like wool, and beneath a thick fleece of very fine silk-like curly wool, similar to that which is found on the celebrated Cashmere goat. Between these two extremes a multitude of differences exist, an account of which alone would more than fill a volume like the present.

To sum up a brief synopsis, it may be stated, that north of the equator sheep flourish the best between the

30th and 55th parallel; the dry and warm climes within these limits being best adapted for the production of the finest kinds of wool; whilst the moist and cooler regions, yielding an abundance of succulent herbage, are most genial to the production of long and heavy fleeces, with proportionate carcasses. In such countries the symmetrical frame of sheep combining the greatest weight of wool and mutton, will always be naturally produced, and in cases where very great care and attention have been paid to the selection and breeding, an amount of excellence has been produced such as would have been incredible half a century ago. The improved Southdowns, Leicesters and Cotswolds, of England, are examples of what care and attention can attain in sheep husbandry. As a general rule, I have found that excellence of mutton is usually produced in moist, whilst fineness of fleece is best seen in dry climates. The character of the pasturage has, however, much to do with the production of each; the effects of this, however, will be considered more fully hereafter, and will have to be referred to more than once. In England the cultivation of extremely fine wool has been almost abandoned, not as many suppose from an entire unsuitableness of climate, for in this respect the English climate is more favorable for the production of fine wool than that of Saxony, from whence are procured the extraordinary fine wool known as "Electoral." The true reason of the almost total abandonment of the growth of fine wool in the British Isles, arises from the spread during the last half century of the growth of

what is usually termed green crops, such as turnips, rape, tares, mangold, ruta-baga, etc., etc., which can be consumed by long and open-wooled flocks during the comparatively mild and open winters of Britain. It will be shown hereafter, when treating of the Saxon Merino, that such a system is wholly incompatible with the growth of fine wool; whilst on the other hand it is specially well adapted for the growth of the greatest weight of wool and mutton in the shortest period on the smallest surface. For such a system of husbandry, the Merino and its Australian and Saxon derivations are wholly unfitted, not only by constitutional disposition, but also from this circumstance, namely, that where fine wooled sheep are allowed to consume succulent and nutritious food in considerable quantity both wool and carcass becomes heavier, but at a sacrifice of the fineness and value of the former; the extra weight of fleece not equaling in value the loss sustained by diminished price. (As an example of this, see Appendix.)

The climate of England is better adapted to the growth of fine wooled sheep than Saxony, and other things, as labor, the value of land, etc., being equal, it could be raised more economically and most probably of a finer texture, than any thing produced in Saxony. Meat however in those densely populated isles, yields a higher monetary return than fine wooled sheep would do, occupying the same ground. It cannot, therefore, be a matter of surprise that the production of fine wool in England has been almost wholly abandoned. In fact

England possesses, or at least possessed until very recently, an indigenous breed of fine wooled sheep, the Ryeland, which has shown itself better adapted than any other breed to consume green food with the least deterioration in the quality of the fleece. This breed, if still in existence, is without any doubt the oldest known as possessed of what is called by breeders "*fixity of type*," its appearance, habits, etc., being the same as they were six centuries ago; there are also strong reasons for believing that they are the ancestors of the Merino. Long however as this fixity of type has existed, it has not been found sufficient to counterbalance the effect of food, for at the commencement of the present century it was found that flocks of Ryelands that were allowed to feed on green crops during the winter, had the quality of their wool deteriorated as regards fineness, when compared with the old style of feeding in cots with straw, pease-haulm, hay and other dry food; the weight of wool on those which were green fed, was however found to have increased.

The example here given will bear a general application, and is one that should be ever kept in mind by the intending flockmaster, and will not be without its use to those already engaged in sheep farming.

Colonel Randall has stated in his work "*Sheep Husbandry in the South*," that warmth of climate renders wool coarser. In this opinion I do not fully concur, but rather infer that when such is seen in warm countries within given limits, that the coarseness will be

found rather attributable to grazing on succulent herbage, which is often found in the vales of countries possessing warm climates. In order to maintain a fine wool it is requisite that the animal should be limited in the quantity of food, and that food ought to be of a dry character. In order to produce wool of the finest staple and in the greatest quantity, with the least amount of superintendence, several things are required, namely: In the first place, a fine wooled flock to start with; secondly, a warm climate; thirdly, dry, nutritious but not over abundant herbage; and lastly, a dry soil, or only possessed of just sufficient moisture as will maintain the pasture plants in a healthy growth. I have already alluded to the fact that in the torrid zone, that sheep when allowed to rove in a state of nature, the wool becomes changed into hair. Mr. Youatt gives an illustration of the converse of this, namely, that the first sheep introduced by the English into Australia, were the coarse, hairy sheep of Bengal. In the short space of three years these were so far changed by the effect of climate and other circumstances, that their hair was entirely gone, and was succeeded by a fleece of wool; of what quality, however, has not been stated. Although the change from hair to wool is a curiously physiological and very instructive fact, the writer doubts whether the wool of animals so descended would in any reasonable period of time become of fine quality; nor would it be very safe for a California sheep-breeder to rely upon his flocks of immediate, or

not very remote Mexican descent, with their straight harsh wool, almost like hair, becoming changed into wool of even moderate fineness, through the ameliorating agency of a California climate. Mr. Youatt further adds: "The Southdown and Leicester sheep were subsequently introduced, and their crosses with the Bengal sheep soon became as fine as the pure bloods of the former." At length some Merinos were imported by the colonists, and says Mr. Youatt, "the experiment was satisfactory beyond their expectation." The third or fourth cross with the then prevalent sheep of the colony, produced an animal with a fleece equal to that of the pure Merino in Europe; and the wool of the pure blood seemed to improve as rapidly as the native breed had done.

Notwithstanding the severe droughts which sometimes afflict Australia, it may perhaps as a whole be said to possess the finest climate for producing fine wool which is to be found in the world. The monopoly of the best *runs* near the rivers by the squatters, gives probably an advantage to the present generation of sheep owners, which may have hereafter to be compensated in some other and probably artificial manner.

From what has already been stated the reader will probably be satisfied to concur with the writer, that for a dry climate, which California most certainly possesses, the fine wooled sheep is best adapted for general husbandry. There are, however, a considerable number of acres of low lands, at present unreclaimed, which

would be better calculated for raising large, long-wooled, heavy fleeced sheep; particulars respecting which will be given when describing the different breeds thus alluded to, as also that of a hardy, mountain race, that would probably acclimate and do well in the Sierra Nevada, or in the lower lands around the vicinity of the mining districts of Washoe, Mono and Esmeralda.

The greatest impediment in the way of the California sheep owner, is the difficulty of obtaining a sufficient subsistence; unless a reserve is made for the purpose between July and the first autumnal showers, which usually occur about the equinox, and also sometimes even in Southern California, after the heavy winter falls; if followed as they are occasionally by frost, or if very lengthened rains happen, the effect is not much dissimilar, namely, the rendering of the naturally hayed grass quite innutritious, at which period the sheep suffer much unless some provision has been made to meet such a contingency. Whether this misfortune arises from frost, or a continuous rain, it is followed by one almost as annoying, namely, the scouring and consequently debilitated character of the young grass. It is not intended to dwell at any length on these points, they are too well known to California farmers; nor have I at present any remedy to offer, excepting that of making some provision for such periodical straights; a piece of advice, of which it will probably be said is much easier to give than to be acted upon. Although

in the present state of California husbandry, it is perhaps difficult to show how this annoyance can be practically overcome, this advantage will arise from alluding to the circumstance as affording an opportunity of pointing out to the sheep breeder, that unless he can find shelter and food to put over these trying times, which occur every year, it will be quite foolish on his part to attempt to rear very fine animals. Practically. therefore, for some years to come, the California sheep owner should attempt only rearing flocks possessing wool of a secondary character as regards fineness, rather than the very best fleeces. In the course of the succeeding pages, the endeavor will be made to show how these points can be best accomplished.

It will perhaps be not out of place to here allude to the suitableness or otherwise of long or short wooled animals as best adapted to cold, wet, dry and warm climates. The short wooled breeds are undoubtedly the best calculated for dry and warm climates, or even for dry and cold ones, but whenever to the other inclemencies of weather is added that of heavy rains, the long, open fleeced varieties are the best, and suffer the least from cold. A little reflection will make this sufficiently obvious. The fine wooled, close fleeced varieties, whilst capable of keeping out light showers, or only permit the moisture to penetrate slightly, become saturated and hold the water during heavy rains ; on the other hand, the more open fleeced, long wooled varieties permit the water to flow off, in consequence of

which the rain is kept from penetrating to the skin for a longer period, than a close wooled fine fleece would keep it off. The former having also the further advantage that the more open locks permit the readier access of atmospheric agencies to dry up any adhering moisture after the rain has ceased.

Moisture however derived, whether the effects of drainage, irrigation, rains, dews, &c., is essential to vegetation; without it the whole world would become an arid desert. The aridity arising from deficiency of moisture is well seen in Lower California, the vicinity of the Colorado, and the great desert east of the Sierra Nevada. Yet all these districts produce a rich vegetation wherever water is accessible, no matter in what form. Thus the character of the flora of a country depends more upon climate than soil. As an instance may be adduced the Brassica, or cabbage tribe, which forms so important a feature of British husbandry. Turnips, cabbage, &c., that will scarcely grow beyond the seed leaves on a sandy soil in a very dry climate—such as Lower or the southern part of Upper California—unless artificially watered during the dry season, will mature in the British Isles to roots and heads weighing from twenty to fifty pounds each. Although much might be done in California to ameliorate the aridity of its southern counties, it will probably be some years before any energetic attempts will be made to do so; consequently I shall not enter at any length into the question of mixed husbandry, such as is pursued in Eng-

land, whereby the flocks are more plentuously fed in winter than in summer, owing to the admixture of arable husbandry along with sheep grazing. It is on the natural pasture grasses and clovers that the California sheep-master will most probably for some time have to depend. Whether or not, at the present time, it would be advantageous for sheep owners to save a considerable portion of oat hay, which grows spontaneously in many districts, and stack it for winter use, rather than allow it to have the greater part of its nutritious properties washed out by the autumnal and winter rains, leaving the poor animals a bite of rotten straw, is a question to which I shall merely draw the farmer's attention, simply remarking that until this is done, or some other or additional means are adopted to secure, at all events, a moderate supply of nutritious food for the periodical pinching seasons, it will be absurd to attempt any considerable improvement in the character of the flocks.

The improved breeds of sheep, whether they are Southdowns, Merinos, Leicesters, Cotswolds, or any other variety, derived their superiority from careful attention to food and shelter, and all such improved blood is calculated to introduce a tenderness in place of hardness of constitution; unless, therefore, a farmer is resolved to adopt improved management along with the introduction of improved breeds, he is more likely to meet with disappointment and loss rather than credit and gain, by crossing his flock with high blooded animals. An exception may probably be made for the

narrow strip of country between the southern seaboard and the coast range, in consequence of the heavy fogs there producing something akin to perennial verdancy. Even here, however, the continuously heavy rains which sometimes occur with tropical intensity, must occasionally exert a malignant influence not only on the animal's growth but in the character of the fleece.

Whenever stock of any kind are confined to a district which from year to year is covered with the same description of pasturage, and undergo the same climatic changes and abandoned to a state of nature, then it will be found that animals so situated obtain, in the course of years, an adaptability for their position of a marked character, being found to suffer less from any periodical privations or hardships than other animals of the same class, even of a hardier character, but accustomed to a different climate and food. If we look at the old California and Mexican sheep we have every indication of animals that for generations have been exposed to all the vicissitudes of heat and cold, drouth and rain, accompanied by uncertainties of food, sometimes abundant and suculent, sometimes meagre and dry, sometimes scarce and bad. All animals of the sheep genus, when so exposed, will usually be found to possess the follow-lowing distinguishing features: The wool straight and open like hair, accompanied by little of the yolk; forehead wide between the eyes; chest narrow; the fore legs entering the chest nearly at the same point; no tendency to put on flesh or fat, particularly on the ex-

terior parts ; the fat in general accumulating on the inside, or what is usually known as offal fat. The last-named fact, although inimical to the farmer's interest, is a wise provision of nature, for it is by the consumption of this accumulated fat that animals exposed to want and cold are enabled to maintain the temperature requisite to support life, when from any cause bereft of adequate food and shelter.

CHAPTER III.

THE BREEDS OF SHEEP BEST ADAPTED TO DIFFERENT LOCALITIES.—Adaptability of Sheep for meeting the urgencies of food and climate—The Merino—Origin of the term—Exportation of Sheep from England to Spain, for the purpose of improving the breed of the latter country—Two varieties of Spanish Merinos—Saxon Merino liable to rot—The Southdown—The Purik—The New Leicester—The Lincoln—The Cotswold—The Chevoit—Extraordinary weight of Lincolns.

It is a pretty well ascertained physiological fact, that the animal system generally has a wonderful capacity of adapting itself to the urgencies of food and climate. The deficiences or abundance of the former, the mildness or rigidity of the latter being met by a conservative vital influence which, more or less, rapidly changes in a greater or less degree some portion or portions of the animal's vital economy, the better to enable it to meet its changed position as regards food and climate. Thus if a close, short-wooled sheep is taken from a dry and mild climate to a moist and cold one, hairs (called "kemps") will soon make their appearance in the fleece, opening the locks, thus adapting it the better to allow any moisture to drain off the fleece. In fact, according to the intensity of climate, whether as regards heat or cold, and in either more particularly when accompanied by great atmospheric moisture, will the fine felting quality of a short wooled fleece be converted, eventually, into a more open, long, combing wool, at each ex-

treme of the scale, namely: under the intense heat of the torrid zone, or in Alpine or Arctic cold, the wool becomes converted into hair like that of goats.

Between these extremes all kinds of wool may be procured, from the finest Saxon Electoral, to hair scarcely capable of making horse-rugs. A sheep yielding wool of the finest quality for felting, if taken from a climate and pasture adapted to the growth and maintenance of these qualities, and removed to one where the pasturage is more succulent, nutritious, and in greater abundance, a deterioration of quality accompanied by a more abundant yield of fleece will speedily be observed; if, on the other hand, it is removed to a more stinted pasture, the wool will be found finer, but the fleece of less weight. In the former it will also be observed that the body of the animal will increase in size, and in the latter diminish. Although general rules may be laid down for the breeds best adapted for special situations, the exact point where the greatest amount of profit can be obtained from a given space of land, expenditure of labor and capital, must always depend greatly upon the judgment of the farmer, for not only do climates and pastures vary, but the important point of markets are also inconstant; thus when the sheep's carcase is of considerable value as mutton, the returns from their fleece may only form a secondary consideration. The future prospects of Californian sheep husbandry indicate, that to the wool must the flockmaster look for returns to meet expenses and allow a profit on his expenditure.

SPANISH MERINO SHEEP.

Holding this view, combined with the fact that the larger part of the pasture lands best fitted for sheep husbandry in California are singularly well adapted for the rearing of those short wooled varieties of sheep which produce the highest priced wool, I shall commence my description of the characters of the various breeds, with

THE MERINO.

This title as applied to a particular breed of sheep and species of wool, is of obscure origin. Mr. Southey, states that *Merino* is an old Leonese title, still preserved in Portugal, though long since obsolete in Spain. The old laws of Spain define it thus: "He is a man who has authority to administer justice within a certain district." The first mention of this office is to be found during the reign of Bermudo II. The *Merinos* then commanded the troops of their respective provinces in war, but before the time of Henrique II. it had become wholly a civil office, and the title was gradually giving place to that of Alguizil. Some have supposed the term has been derived from the Arabic title Mir, or Emir. Mirquibir, the augmented title, is said to have been in use at Ormuz. As Persia has been famed, time immemorial, for a breed of sheep possessing remarkably fine wool, it is possible the Moors may have introduced into that country both the breed and the title, if this theory is correct; if true, however, there are strong reasons for believing that the wool had greatly dete-

riorated. Startling as it will appear to most persons, very good evidence can be adduced, that the improvement of the Spanish Merino commenced some centuries ago, by crossing with an English breed the Ryeland.

It is the common opinion in England, in the United States, and in fact wherever the English language is spoken, that to Spain was England's flocks indebted for a cross with Merino blood, and so far as the effects produced from importation made under the patronage of George the Third, at the end of the last century, this is true; but centuries prior to this period, fine-wooled sheep had been sent from England into Spain. That sheep were sent from England to Spain, at known periods, is certain. Mr. Youatt, quoting from the Chronicles of Stowe, states as follows: "This year (1464) King Edward the IV. gave license to pass over certain *Cotteswolde sheep into Spain." He also quotes Baker, who says: "King Edward IV. entered into a league with John, King of Arragon, to whom he sent a score of *Costal* ewes and four rams; a small present in

* The practice of cotting is one still followed in Herefordshire. Cots are small houses of usually a couple of stories, with gangways to ascend, in which sheep are kept during inclement seasons, and fed on straw, etc., the favorite kind being pease straw. I have seen it stated, that this practice was introduced by the Flemings, during the 17th century; but if by the Flemings, at all, it was probably during the 14th century, in the Reign of Edward the Third—at which period a considerable immigration into Gloucestershire of Flemish cloth-workers took place, who subsequently established the far-famed reputation of West of England cloth. Shakspeare in Henry IV., part 2d, alludes to "Will Squeale, a Cotswold man."

show, but great in the event, for it proved of more benefit to Spain, and more detrimental to England, than could at first have been imagined." Sheep were exported from England to Spain, according to Mr. Southey, at a still earlier period. Mr. S. states that "Fernan Gomez de Cibdarial, in one of his letters, mentions a dispute between two Spaniards concerning rank, in the presence of Juan II., 1447. It was objected, tauntingly, to one of them, that he was descended from a judge of the Shepherds, that is from a *Merino.* The reply was, that this office has always been held by *hidalgos* of great honor, and that King Don Alfonso had instituted it in the person of Inigo Lopez de Mendoza, *when the English sheep were first brought over to Spain.*"

This dispute occurring in 1437, and referring to an ancient title of honor, which had been conferred as far back as the time of the introduction of English sheep into Spain, and a taunt also being given to a *descendant* of a Merino, it is clear that the English sheep referred to could not have been the Cotteswoldes exported in 1464, as mentioned by Stowe. How long was it before the Merino fleece became finer than that of the original stock? asks Mr. Southey, and he replies: "Brits, who wrote towards the close of the sixteenth century, says in praise of the wool grown about Santarem, it is so fine that *it may vie with that of England.*" Another important fact also mentioned by Mr. Southey, is that when Catherine, daughter of John of Gaunt, was espoused to Henrique III., she took sheep with her as her

dowery. This exportation would be about the year 1390. If the English sheep had been of an inferior description to those of Spain, it is not likely that the future Queen of Castile would have taken them with her for her own dowery. It may be remarked, that if the King Alfonso, mentioned above as having instituted the order of Judge of the Shepherds, is Alfonso the Wise, King of Leon and Castile, who is stated to have digested a code of excellent laws, and rendered his name famous in history by his patronage of the arts and sciences, he reigned from 1252 to 1284—it thus places the period of the *first* introduction of English sheep into Spain so long as six centuries ago. The above facts, recorded in Spanish history, are not given as a mere piece of curious ovine history, for reasons which will be shown hereafter, and will be not unfrequently referred to as of deep importance to whoever intends to promote the improvement of California sheep so far as the fleece is concerned.

The evidence, as a whole, appears tolerably clear to the writer that the origin of the race at present known as Merinos is to be traced up to the Ryelands and Cotteswoldes; the latter, as exported to Spain, being, most probably, a small breed of fine wooled sheep analagous to the Ryelands of the adjoining county of Hereford. Any one who has seen a true Ryeland and a high bred Merino ewe, must at once be struck with the striking similarity of frame, fleece and general contour, the Ryeland being rather smaller than the Spanish Merino.

The rams are not so much the counterpart of each other, the Spanish ram being much more throaty, and generally of a more awkward frame, and not possessing so many fattening points. Holding these views, it would, perhaps, be as well to consider the Ryelands and Merinos under one head; as, however, there are some characteristics in the economy of these animals that vary their identity, and never having been fully recognized, I, in deference to public opinion, shall treat of them separately.

It is not generally known that the common name Merino is given to two distinct breeds of dissimilar appearance, which, from all the information that has reached me, have defied every attempt at engrafting the superior merits of one on the other, or supplying the mutual deficiencies of either species by means of crossing. These breeds, if I recollect aright, have received the names of the "Escurial" and the "Infantado" or "Negreti." The former affords the finest wool, and from its general appearance rather indicates an eastern origin, such as may possibly be derived by descent from the breed which produced the celebrated fine wools of Persia. If of English descent, their ancestors were probably the Morfe Common sheep, celebrated in ancient times as producing the finest wool in England, a cross between which, the Forest of Clun sheep and the Southdown has formed the foundation of the new race of Shropshire "Downs," which has existed during the last few years, and still attracts the attention of the foremost English

sheep-breeders—an interest which is not at all likely to abate. The Escurial possesses a long, spare neck and head, with very little wool on the latter ; has a finer, shorter and softer kind of fleece than the Infantado breed, but yields an inferior weight of wool as compared with the latter species. The Escurial is the kind which was presented by the King of Spain to the Elector of Saxony in 1765, where they obtained the appellative of Electorals. Of these, Captain Stanley Carr observes : " I am aware that these sheep have frequently been brought to Britain from Spain, but there never was labor more lost, as they cannot thrive in a damp climate ; besides it is quite necessary that they should have a wide range of dry and hilly pasture, of short and not *over-nutritious* herbage. If allowed to feed on swampy or marshy ground, even once or twice in autumn, they are sure to die of liver complaint in the following spring. If they are permitted to eat wet grass, or exposed frequently to rain, they disappear by hundreds with consumption. In these countries (Central Germany) it is found that the higher bred the sheep is, especially the Escurial, the more tender. They are always housed at night, *even in summer*, except in the very finest weather, when they are sometimes folded in the distant fallows, but never taken to pasture till the dew is off the grass. In winter they are kept within doors altogether, and are fed with a small quantity of sound hay, and every variety of straw which has not suffered from wet, which is varied at each feed ; they pick it

over carefully, eating the finer parts, together with any corn that may have been left by the threshers. Abundance of good water to drink, and rock salt in their cribs, are indispensible."* Captain Carr further observes that "the Merino is a long-legged, narrow-bodied, ugly animal, with a fleece varying in weight in proportion to its corseness, (although fine wool is specifically heavier than coarse) from two to three pounds. The staple is very close and thick growing, greasy or oily to the feel, elastic and soft, very tenacious, and formed differently from any other wools, with a number of regular minute bends or curls in each hair." There are also different sorts of wool upon the same sheep, and that animal is of course the most esteemed which produces the highest qualities in the greatest proportion. Breeding successfully with this view is a most difficult science, requiring years of pains-taking intelligence to attain. I was present at an exhibition of twenty-two rams at the cattle show of Gustron, in Mecklenberg, in May, 1837. The specimens, to an inexperienced eye, appeared much alike; they were carefully washed and shorn, the fleeces numbered and sent to the most eminent wool-staplers at Leipzic, when they were submitted

* Captain Stanley Carr, by whom the above account was written, is to my personal knowledge a very observant gentleman, who to an acquaintance with English farming, adds the advantage of having had much experience in sheep farming, both in Australia and Germany. Any remarks from him, therefore, possess a more than ordinary value. Some of the matters alluded to by Captain Carr will have to be referred to hereafter.

to accurate assortment and valuation. The heaviest fleece weighed 162½ half ounces, and was valued at 2 dollars 1 groschen 1⅝ pence, being the lowest value placed on any fleece, excepting one which weighed 98⅜ half ounces, and valued at only 1 dollar 19 groschen 5¾ pence; whilst the *lightest* fleece of the lot, weighing only 67⅝ half ounces, obtained the *highest* money valuation, namely, 3 dollars 5 groschen 7 pence. (For details, see Appendix.)

The Infantado or Negretti Merino is distinguished from the Escurial variety by shorter legs and stouter make; the head and neck usually short and broad, the nose short and turned up, and the body round like a barrel. The wool is often matted upon the neck, back and thighs, grows on the head to the eyes, and on the legs to the feet. The yolk and grease on the fleece becomes almost pitchy, and when dust and dirt becomes mixed with it, the washing is a matter of difficulty. The fleece of the Infantado is generally thick, closely grown and abundant, ewes yielding 2¼ up to 3¼ pounds if carefully fed, (they should not, however, be highly fed, otherwise the wool becomes wiry and hard.) Rams and wethers reach four and sometimes six pounds. This animal was introduced into Austria from Spain, and from which has been derived the one known in the United States as the improved French Merino, of which extravagant statements have been made in California, such as fleeces weighing 43 and 38 pounds each. It is not at all probable that a single fleece of this species has

been raised in California that has weighed so much as 15 pounds of clean washed wool, the balance being not only yolk and grease, but such a quantity of dirt and filth as completely prevented a fair examination of the staple. This is only alluded to because false and exaggerated statements are only calculated to retard rather than promote agricultural improvement.

Captain Stanley Carr remarks that experience has shown that, to breed with advantage, all the rams, be the ewes what they may, should be either thorough-bred Infantados or Escurials, and that the same strain of blood should be persevered in. The Captain alludes to an instance where a large and valuable flock has been for years retrogading, in consequence of *one* unsuitable ram having been introduced twelve or fourteen years previous. He further adds, that good rams are of course becoming every year more attainable, but that there were still examples of breeders in Saxony who obtain for distinguished rams as much as 100, 200 and even 300 Louis d'ors.* On many accounts, however, it would be more advantageous for the California sheep-breeder to obtain any additional blood of the Saxon Merino from Australia rather than from Germany. The blood may not be so pure nor the wool so fine, but the question arises, is the general California farmer prepared to maintain these very highly bred animals with

* From 500 to 1500 dollars. This was written by Captain Carr eighteen years ago. The price must have become much reduced since that time.

shelter and food during the winter? whilst, on the other hand, the animals obtained from Australia are derived from a climate much more nearly assimmilating to that of this State; besides, the Australian sheep for some generations have been accustomed to be out all the year, whilst the German Merinos have been used to a temporary shelter. Both German and Australian sheep, if obtained from the best flocks, have had the advantage of careful selection, and some attention paid to the mutual adaptation of the rams and ewes for breeding purposes, so as to obtain the greatest amount of excellencies in the progeny with the smallest proportion of defects. These are points which do not appear to have ever been very particularly attended to in Spain. In that country not only has the bulk of the male lambs been permitted to promiscuously grow up, mix and breed with the ewes, but in addition to such a rude mode of breeding sheep, that fixity of race which is justly looked to as so important a point by modern agriculturists, has been further interfered with by the practice which obtained with the greater part of Spanish flocks of moving them over great tracts of countries twice a year, during which periods they necessarily pastured on a great variety of soils, possessing herbage of varied quality.

Spanish sheep are divided into the estante or stationary, and the transhumantes or migratory. The stationary sheep are those that remain during the whole of the year on a certain farm or district, where sufficient provision is provided for them during winter and sum-

mer. The transhumantes wander hundreds of miles twice a year in search of pasturage. These journeys can be traced back to the middle of the fourteenth century, when a tribunal was established for their regulation. It was called the *Mesta*, and it consisted then, as it continues to consist, of the chief proprietors of these migratory flocks. It established a right to graze on all the open and common land that lay in the way ; it also claimed a path ninety yards wide through all the inclosed and cultivated country ; and it prohibited all persons, even foot passengers, from traveling on these roads while the sheep were in motion. The number of these migratory sheep is estimated at ten millions. The wonder is, not that the Spanish Merino is a somewhat imperfect animal, according to modern views, but rather that the Merino still retains so many desirable qualities. One of the evils caused by such a nomade life is that the Spanish Merino is but an indifferent nurse, and it is stated that nearly one-half the lambs—or in bad seasons, and when the pasture fails, full three-fourths—are destroyed as soon as they are weaned. The males always being sacrificed first, the remainder are usually suckled by two ewes. A comparison of the merits and demerits of Merinos will hereafter be made, after describing some of the other varieties of sheep which are more or less deserving of the California sheep farmer's attention.

THE RYELAND, RADNOR FOREST, CLUN FOREST, AND MORFE COMMON SHEEP, ETC.

There exists scarcely a doubt but the three varieties first named, have a common origin, and in the author's opinion the Infantado breed of Merinos are derived in the greater part from one or other, if not all, these species. In order that the reader may not be led away by what might be suspected by some persons, that the author is "riding a hobby horse," I shall quote as much as possible the authority and opinion of others. Speaking of the sheep of Radnor, Mr. Davis in his report of South Wales, (1814), says: "But the general character of the sheep of this county, is to be found in the Forest of Radnor, and on the sound wastes of the Eastern parts. These seem to have been produced by a cross of the mountaineers with the Forest of Clun sheep, in the adjoining part of Shropshire. They are fuller fleeced than most breeds, *being muffled up to their noses, their legs nearly covered*, and their tails resembling that of beavers. The wool has fewer kemps than any mountain breed, and was formerly reckoned the finest in Wales. The wool of this tract is still of good quality, and in great request for the manufacturing districts of cloths and flannels."

In 1850 I found sheep answering the above description, not only in Radnor, but plentifully distributed amongst the hills of medium altitude and dry pastures in the neighboring counties of Monmouth and Brecon;

in fact all through that interesting region of Redsandstone, made classic by the geological researches of Sir Roderick Murehison in this part of Siluria. Mr. Davis proceeds to say : " The features of this breed are somewhat uncouth, but few sheep turn out more profitable ; they are not so restless and mischievous as hill sheep in general, and collect inside fat perhaps beyond any other breed—ten and twelve pounds of rough fat are not uncommon : and we were informed, that a chandler at Knighton, once bought the rough fat of a hill weather weighing twenty-two pounds." A correspondent of Mr. Davis, the Rev. W. J. Rees, reported : " The sheep of this county are in general small, weighing when fattened, from nine to fourteen pounds a quarter. A *lean sheep* is remarked to have the finest wool, though smaller in quantity. The average is two pounds to a fleece—selling in 1812, for 30 shillings ($7 50), a stone of fifteen pounds." The Forest of Clun is a division of the county of Salop, usually called Shropshire, which adjoins Radnor, and approximates to Herefordshire. From the time that I first became acquainted with the Forest of Clun sheep, I have always held the opinion, that they and the Ryeland are only varieties of a special stock ; the Ryeland having had devoted to it the greatest amount of care, attention and selection, pursued during the longest space of time. There is a probability that these handsome and hardy little sheep will be preserved, and perhaps improved, as of late years ; some West End butchers advertise during the

winter months, having Clun mutton constantly on sale, which they are now able to do owing to the facility of railway communication. In this way it may be possible yet to secure some of this valuable variety of sheep, should the thorough-bred Ryelands be now wholly extinct, which is quite probable, as they were nearly so when I wrote the report in 1852, on the farming of Herefordshire, which obtained the prize of $250 from the Royal Agricultural Society of England. In that report I stated that the system of soiling turnips with sheep, combined with the difference in the values of British fine wool at the present period, as compared with those which ruled at the commencement of the present century, has caused a complete change in the species of sheep which are now bred by Herefordshire flock owners. At the former period, a small breed indigenous to this and the neighboring old redsandstone districts, was the usual one ; they were small and hardy, with a fine fleece ; the choicest specimens were known as Ryelands, and it is only in the vicinity of Ross, that the true breed are to be found. They are very like the Spanish Merino, especially the ewe ; are small, white faced, and hornless ; they lamb in February and March, and are sometimes "cotted,"* when pease haulm is

* Cotting is stated on the authority of Systena Agriculturæ, folio, London, 1668—to have been introduced by the Flemings into England, about the year 1660. This, I conceive, is a mistake ; it is probably cotting might have been introduced from the Cotteswoldes into Hereford, by Flemings, or their descendants ; cotting must surely have existed at the Cotteswolds earlier than this period. The deri-

generally given to them. The weight of wool only averaged about two pounds per fleece, but in quality has always been estimated as equal to Merino. A cross between the Southdown, Ryeland and German Merino, would probably prove a most valuable animal as likely to supply fine wool with sufficient carcase, and possessed of rapid feeding qualities; it is in the latter quality that the old Ryeland sheep fails in comparison with the New Leicester and improved Southdowns.

The Ryelands have been crossed with the early improved Leicester, from which cross has descended a large part of the mongrel animals which are now found in the country. The Ryeland is the quickest and best feeder of English original and improved breeds, and, with the exception of that hardy mountain race, the Hardwick, yields the finest flavored mutton of any breed. Mr. Knight, the celebrated horticulturist, remarked respecting the Ryeland and its crosses, that "about seven years ago I [Mr. Knight] mixed a few Southdown sheep with my Ryeland flock, in order to ascertain their comparative merits. The lambs proved much more patient of cold than those of the Ryeland breed when very young; but both the lambs and parent sheep appeared to fare ill on the fallows and the mountains, where the Ryelands kept in good condition; and the experience and opinions of some of my acquaintance who have made similar experiments, induced me to

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vation is Cot and Wold, both Saxon words—the former meaning a small or mean habitation; the latter signifies a plain, open country, that is free from wood.

think the Southdown much inferior to the Ryelands or fine wooled breed of Herefordshire, which till lately has attracted little attention from the public. This animal appears to me much more patient of hunger, and to keep itself in better condition on a less quantity of food, than any other which I have had an opportunity of observing. To the great scantiness of the pasture on which it is usually condemned to feed, is to be attributed the fineness of its fleece; for the quantity of this becomes immediately increased by a copious supply of food; and this circumstance should be attended to in every country where these sheep are introduced." Mr. Knight continues: "Some attention has been paid to its improvement; and although the wool is somewhat less fine in its quality than it formerly was, it is still the finest on the Island, with the exception of the Spanish sort re cently imported; and the animal must be allowed, on the whole, to have been considerably benefited. The quantity of wool afforded by the improved sort of Ryeland, although increased, is far from large, a three-year old wether rarely yielding more than three pounds and a half. But a large number of sheep will subsist on a small portion of ground, and the wool is worth two shillings and sixpence the pound, its value according to the quantity of food consumed by the animal is probably much greater than that afforded by any other breed. The Ryelands readily acquire, on a very moderate pasturage, that degree of fatness which renders its flesh more acceptable; but it is wholly incapable of being loaded with fat in the manner of Mr. Bakewell's (Dish-

ley or New Leicester.) It appears to me to fatten more quickly than those I have seen of the Southdown breed." Mr. Knight tried a cross between the Ryeland and the Merino. The wool was described as excellent and in large quantity; and he did not hesitate to declare that the merits of the fleece connterbalanced every defect. Mr. Knight was a keen but cautious and prudent observer, and any opinion formed by him from actual experiment is worthy of the highest respect.

As regards the Morfe Common sheep, the wool from which was prized so highly some centuries ago, little can be said. Morfe Common is situate near Bridgenorth, and at the beginning of the present century was about five miles in length by from two to three miles in breadth, having several smaller commons of a like character in the vicinity. The soil, and position as regards climate, was perhaps one of the most suitable for the production of fine wool that could be found in England. It is very doubtful if a single animal of the true Morfe Common sheep, which yielded the famed fine wool, is now in existence. For its probable character we have therefore to refer to the general type of the old Shropshire breed, which possessed mottled faces and legs. They were about as large as Southdown sheep, and possessed a longer neck, but were more ungainly; in the points, therefore, of fineness of wool, elongated neck and awkward-looking frame, it will be seen that they in some degree resemble the Escurial Merino. It is not unimportant to observe these characteristics in tracing the probability of the descent

of the Merino from an English source. I do not, however, conceive that the famed Morfe Common sheep resembled the horned variety alluded to, but rather that they were like the Cannock Chase sheep of the neighboring county of Stafford ; also, that they were a superior species to the last named. During the present century the Cannock Chase sheep have been crossed with both Ryelands and Spanish Merinos, in both cases with great advantage as regards the quality of the wool. Indeed, it is quite probable that the sheep which formed the dower which John of Gaunt, Duke of Lancaster, gave to his daughter Catherine, when she married the heir to the throne of Castile, were obtained from Cannock Chase, as the Duke owned immense possessions in the county of Stafford—Cannock Chase being amongst the number. The distinguishing characteristics of this breed are grey faces, varying from nearly white to nearly black, with every intermediate shade, the legs in color resembling the faces ; the wool fine, closely and compactly covering the carcase ; hornless, and of moderate size. When fed on sound land and fair pasture they thrive quickly, and make excellent mutton ; the principal fault is a deficiency in thickness as compared with their length, a point in which it resembles the Escurial Merino.

It was observed by some one, whose name I now forget, that, for its hardiness in subsisting, without seemingly any serious inconvenience from its ordinary food being withheld for lengthened periods, the Radnor sheep ought to have an altar erected to its honor

SOUTH DOWN SHEEP.

in the Temple of Famine. This quality the Ryelands and others above mentioned also possess in an eminent degree.

THE SOUTHDOWN.

The Southdown may be described as the enlarged and improved type of the indiginous short-wooled breed of English sheep, of more diminutive size, but of hardier constitution. The same animal is to be found in Wales as a Radnor and Brecon, in Ireland as Wicklow and Kerry—in the latter places, however, the fine short wool is mixed with a quantity of kemps, or hairs ; even on the Surrey hills, where the extensive waste of green sand afford but a scanty bite, the Down sheep are but of diminutive size, have a kempy fleece, but the mutton is delicious. The Southdowns, from which the improved breed of Down sheep has received their distinctive appellation, are a long range of chalky hills in the south of England, principally situated in the counties of Sussex and Hampshire. They occupy a country upwards of sixty miles in length by about six in breadth. They consist of low rolling hills of chalk, abruptly cut off by the English Channel, where they form the well-known white Cliffs of Albion. Some portions of the interior rise to the height, probably, of seven hundred feet ; they are bleak and exposed ; the grass is usually short ; the the clime, for the British Isles, may be termed dry ; the fissured character of the chalk rock rapidly absorbs any rain that may fall, so that, generally speaking, the pasturage on these downs is usually tolerably dry.

Until the introduction of the modern green crop system, the wool of the Southdowns was considered sufficiently fine to manufacture second-class cloths; with, however, the introduction of what has been termed the "soiling" or green food system of feeding, the fleeces became coarser. This took place almost simultaneously with the improvement of Southdown sheep by the late Mr. John Ellman of Glynde, near Lewes, Sussex, who describes them prior to his improvement as follows: "This breed was formerly of a small size, and far from possessing a good shape, being long and thin in the neck, high on the shoulders, low behind, high on the loins, down on the rumps, the tail set on very low, perpendicular from the hip bones, sharp on the back—the ribs flat, not bowing, narrow in the fore quarters, but good in the leg, although having big bones." Afterwards he described them, when improved in shape and constitution, as "smaller in bone, with a greater disposition to fatten, and much heavier in carcass when fat. They used seldom to fatten until they were four years old; but it would now be a rare sight to see a pen of Southdown wethers at market more than two years old, and many are killed before they reach that age."

The Southdowns are polled; they are amongst the healthiest of breeds, and possess a patience under the effects of occasional short keep much beyond the other improved varieties.

It has already been indicated that the New Leicester was formed by crossing; the improved Southdown has been formed entirely by selection. Mr. Farncombe, in

his prize essay on the farming of Sussex, after paying a justly deserving tribute to the memory of Mr. Ellman of Glynde, states: "The mode adopted, and still continued, which produces so much perfection, is in the choice of the ewes to the rams, and the constant attention to the produce from such selections. This should be practiced annually by every flock-master, who might thereby much improve his flock. As one ram* only is necessary for one hnndred ewes, so would the expense be small and the trouble little for him to be always certain of the sort he is breeding from; but when fine rams, perhaps of different character and blood, are used indiscriminately amongst five hundred ewes, such uncertain breeding renders it impossible that he can make any selection from them to be depended on for stock. This, with hard keeping, accounts for the inferior character of so many Southdown sheep." It would be useless to dwell upon the many exellent qualities and symetrical form of the picked animals belonging to this breed; that excellence, however, which will be most prized by the California sheep-breeder will be the great equality of the wool and the comparative small amount of the inferior sorts produced by it. The wool of sheep that graze on the chalk districts is usually found to be harsher than that obtained from sheep fed on other soils, especially those of a light, loamy description. Transported to a soil and climate so congenial in most respects for the growth of fine wool as the southern counties of California, by all analogy and experience the

* This, in the writer's opinion, is too small an allowance.

Southdown wool would improve both in quantity and quality. On both these points considerable changes have taken place since the commencement of the present century, when, according to Mr. Locock, the fleece of a Southdown hill sheep weighed two pounds; in 1830 it had increased to three pounds. The fleece of the low-land sheep that in the first period weighed three pounds, at the latter weighed three and a half and sometimes four pounds. This increase is attributable to the joint influences of breeding from selected and improved animals, and a changed mode of winter feeding by the extended cultivation of what is usually known by the name of green crops. The length of staple in the hill sheep rarely exceeded two inches, and was oftener not more than one and a half inches; it now approaches three inches, and in some lowland flocks exceeds four inches in length.

One species of Southdown wool has advanced in comparative value beyond others, namely, the hogget wool, or the wool left on the sheep untouched until the second shearing. This enters largely into the manufacture of mixed stuffs, composed of silk and wool principally; it also makes pretty fair shawls.

THE DORSETS.

The Dorset Horns, as they are locally called, possess some qualities which it would, perhaps, be improper in a work of this character to entirely overlook. In the true breed, both the male and female possess horns. The true breed is now scarce, being confined to one

district of the county, and the adjoining Isle of Portland, which is famed for its mutton. The frame of the true Dorset very much resembles the old Spanish Merinos, but with a much coarser fleece. The pure breed is now only maintained in England, for the purpose of obtaining early lambs—Christmas house-lamb. They, however, have another quality, which might probably prove valuable in California, namely, their extraordinary prolificacy—the ewes generally having two and often three lambs; add to this the fact that they will continue to lamb for fifteen to sixteen years, it will be seen that the breed possesses merits of no common order for a county where it is desirable to replace a coarse stock, such as the Mexican. Although the Dorset wool is not so fine as the Down, yet it usually obtains a higher price, being better adapted for special manufactures.

Portland mutton is prized by epicures, and is considered at the best, at between five and six years of age. Mr. Ruegg in his report on the farming of Dorsetshire, states, that "a butcher mentioned to him that he did not kill one particularly delicate little ewe, until she had attained her majority of twenty-one years."

If the ewe is well kept and in good condition, she will take the ram in April, lambing in September; the lambs being fed for market by Christmas.* The ewes are excellent mothers, and if properly kept, yield a large supply of milk, and will take the ram and be-

* This applies to England; there can be scarcely a doubt but if removed to California, this might be made to take place much earlier.

come again impregnated while rearing her last progeny. It would be fair to calculate, that under proper treatment, a Dorset ewe would rear, on an average, three lambs a year; one set of which would be fed for the Christmas market, when lamb is expensive. It is probable that adobe soils would prove best adapted for the Dorset breed. They make an admirable cross with the Merino.

THE PURIK SHEEP OF THIBET.

The attention of Europeans was first drawn to this curious breed of sheep, by Mr. Mooncroft, during his adventurous explorations of Thibet, about forty years since. Falling a victim to the hardships of the expedition, no second notice was trnsmitted. An interest was again excited in England, owing to the Queen having received a few as a present, about ten years since. It will be well, however, in the first place, to transcribe the information given by Mr. Mooncroft, who states: "that the breed of sheep of Ladakh, when at full growth, scarcely acquires the size of a Southdown lamb of five or six months; yet in the fineness and weight of its fleece, and in the flavor of its mutton, added to its peculiarities of feeding and constitution, yields not in merit to any race hitherto discovered. Perhaps the dog of the British cottager is not so completely domicilated as is the *Purik* sheep of this country. In the night it finds shelter either in a walled yard or under the roof of its master, and frequently in the day picks up its food on a surface of granite rock; where the eye of the cursory inquirer can scarcely dis-

cover a speck of vegetation, though a closer investigation shows stunted tufts of wormwood, hyssop, bugloss, and here and there a few blades of a dwarfed grass. But the indefatigable industry of the animal detects and appropriates substances so minute and uninviting as would be unseen or be neglected by ordiaary sheep, or those of larger breed even in this country, (Thibet.) Almost all the land round the Capital is under tillage for wheat and barley, and in lucerne, but the harvest will not have been two months off the ground and not a single blade of vegetable substance shall be discovered; not a stem of stubble, nor a crown of lucerne. The stubble is bitten off by the common cow, the tho, (a hybrid between the yak male and the cow,) and the shawl goats; whilst the ass not only devours the stock of the lucerne, but by pawing lays bare the tap-root of the upper part, of which he generally gets about three or four inches."

"The *Purik* sheep, if permitted, thrusts its head into the cooking pot, picks up crumbs, is eager to drink the remains of salted and buttered tea or broth, and examines the hands of its master for *lattro*, (barley flour,) or for a cleanly picked bone, which it disdains not to nibble. A leaf of lettuce, a peeling of turnip, the skin of an apricot, are its luxuries. The coarse black tea of China forms the basis of the nourishment of the inhabitants of this ill-governed country, and its use is conducted with the utmost frugality. Rubbed to a powder and tied in a cloth, it undergoes frequent boiling, and when it has given out the whole of the coloring matter—

a process rather tedious—the residue falls to the share of the sheep."

"The Purik sheep gives two lambs within twelve months, and is twice shorn within that period. The clip may afford three pounds, in the annual aggregate; the first yield is fine enough for tolerably good shawls."

Mr. Howard, her Majesty's bailiff, has stated that when fat they would average 32 to 40 pounds each, and he thought that two or three could be maintained at the same cost as one common sheep; they had very thick coats, into which cold could scareely enter. The clip of wool weighed as follows:

Fleece of ram, 5 pounds; fleece of three year old ewes, 8 pounds; fleece of three teg ewes, $6\frac{1}{2}$ pounds.

THE NEW LEICESTER.

In this breed the head should be hornless, eyes prominent, with a quiet expression; ears thin, long, and directed backward. The neck full and broad at its base, gradually tapering towards the head; breast broad and full, shoulders broad and round; the arm fleshy through its whole extent down to the knee; the bones of the leg small, standing wide apart; no looseness of skin about them, and comparatively bare of wool. The quarters long and full; the thighs also wide and full; the legs of moderate length. The pelt moderately thin, but soft and elastic, covered with a good quantity of white wool, not so long as in some breeds, but considerably finer than that of long wools in general.

The great recommendations of this breed are its handsome form, comprising within the same apparent dimensions a greater weight of carcass than that of any other breed; an early maturity, and propensity to fatten, especially in the exterior parts, accompanied by a proportional diminution of offal, such as is found in no other kind of sheep; thus insuring the greatest money return for the quantity of food consumed in the shortest period.

About the middle of the last century, Mr. Bakewell, of Dishley, in Leicestershire, first applied himself to the improvement of the sheep of that county. Mr. B. always maintained his own secret as to the means by which he operated; some have contended that his improvements were effected by mere selection, others by crossing; the writer of this believes that both methods were employed, and from details which will hereafter be given, he will leave the reader to judge how far his opinions may be correct.

Up to this period very little attention had been paid to the breeding of sheep. Two objects appear to have alone engrossed the attention of breeders; first, to breed animals of the largest possible size; and secondly, to obtain the heaviest fleece. Aptitude to fatten, and that symmetry of shape which is found to coincide with the formation of meat and fat in the greatest quantity on the most valuable parts of the animal, which experience has found to be accompanied by a diminution of offal, were entirely disregarded.

Notwithstanding Mr. Bakewell's reserve, he could scarcely avoid making public some of the general rules which he followed, maintaining, nevertheless, a profound silence as to details ; a mystery which he retained to his death ; nor is there any probability that prior to that event he imparted his secret to any one. We are therefore left to conjecture as to the precise mode which he pursued in forming the animal so well known as the New Leicester. By however taking advantage of the rules which he has and was the first to lay down, as well as comparing them with what is now pretty well established, and intertwining the whole with some floating traditions, possessing strong features of inherent truth, we may probably not go far astray in conjecturing the precise mode which he followed.

Although Mr. Bakewell left the world without giving his successors all the advantage of his great experience, the world still is, and ever will be, greatly indebted to him ; for it was he who first pointed out practically and formed sound theories as to the mode which should be adopted, in order to increase the development of the carcass without addititional expenditure of food. These efforts were not confined to sheep ; the same rules were applied to neat cattle and swine, which were followed by great improvements in both these species of stock. From the impetus thus given by Mr. Bakewell, the New Dishley pigs, and improved Long-horns, for nearly a quarter of a century, illustrated the benefits of his example ; until these gave way to the more prominent

merits of Short-horns, Devons Herefords, and various breeds of swine. Mr. Bakewell must ever be esteemed one of the quiet but great benefactors of mankind, yet it may be doubted if at the time of his passing away from this earth, he had more enemies or friends; historical justice enjoins the writer to state, with regret, that he believes the former were by much the more numerous. As with all attempts at the introduction of improvements calculated to interfere with the pre-existing modes and opinions of a not very highly educated part of the community, who relied upon high traditional practice for justification in pursuing the method of their forefathers, it might be anticipated that Mr. B., in common with all improvers, would have to encounter that inertness of the masses which has ever been found so great an obstacle to the immediate introduction of any improvement or discovery. Added to this common ground of obstruction, offence was taken at the reservedness of Mr. Bakewell, and what was called the monopoly of the Dishley club,* which, combined, aroused a great amount of indignation; balked curiosity with some, being placed at a disadvantage in obtaining the new fashioned stock by others, caused Mr. Bakewell to have many enemies, and much vituperation being poured on his head.

* A Club, by which picked rams of the Bakewell breed, and belonging to the members thereof, were only permitted to be used by its members; all other ram lambs being castrated. Fifteen thousand dollars was demanded on one occasion, and if I recollect right, was obtained, for the use of one ram—to be confined to forty ewes, for one season only.

Whatever we may have had handed to us from so profoundly an observant man as Mr. Bakewell, we ought to heed most carefully, the more particularly so, as subsequent experience and practive have proved their soundness. Mr. Bakewell observed that animals of moderate size increased in weight more rapidly than very large ones, and that they consumed much less food; that the same quantity of herbage applied to feeding a larger number of small sheep, would produce more meat than when applied to feeding the smaller number of large sheep which alone it would support. He also observed that sheep carrying a heavy fleece of wool, possessed less propensity to fatten, than those which carried one of a moderate weight.

Acting upon these observations, it is most probable, that in the first instance, Mr. Bakewell selected from the different flocks in his neighborhood, without regard to size the sheep which appeared to him to have the greatest propensity to fatten, and whose shape possessed the peculiarities which he considered would produce the largest proportion of valuable meat with the smallest quantity of bone and offal. In the course of his trials it is probable that he was still more inclined to lean to smaller sheep, from the consideration that perfection of form is the more frequent accompaniment of a moderately sized animal than a very large one; this and another important matter, probably led him for the improvement of the wool, to cross his pre-existing sheep, improved by selection, by a dash of blood that would

give a more silky character to the fleece and to the body a more symmetrical form; these desirable qualities he found in the Ryeland, for the Ryelands possessed in the highest degree of any breed then found in Britain, the following features, namely:

1. Fixity of type; at that time neither so well understood nor appreciated as it is at present. There can however, be scarcely a doubt, but this and the following distinctive features have been maintained by the Ryelands upwards of six centuries:

2. Possessed of very fine wool, the finest on the Island, with the exception of its congener, the Morfe Common sheep.

3. A handsome, compact, and well-shaped frame.

4. A kindly disposition to fatten, as compared with contemporary breeds.

5. Hardiness of constitution.

6. The ewes prolific, and excellent mothers.

In this one breed, therefore, were found almost all the desirable points required by Mr. Bakewell; one obstacle, however, existed, which was the probability of the progeny resulting from a cross between the then improved Leicester, a large, and the Ryeland, a small sheep, might be productive of disappointment, some Cotswold blood was intermixed, and probably some Bampton Notts. A man who was in the secret, and employed by Mr. Bakewell in bringing rams and ewes, by night and by-ways, from Herefordshirh, not obtaining the reward he expected, gave publicity to the fact

of his having been so employed; thus giving rise to an opinion which generally obtained in Herefordshire and the border counties, that the improved breed was simply a cross between the old, ungainly Leicester, and the handsome, compact Ryeland. Although the evidence is highly probable, that Ryeland blood was employed both through ewes and rams, by Mr. B., I do not suppose that the means he adopted was in anything like so direct a manner. But that he rather used them indirectly in a mode which is so susceptible of variation, that it would be idle to speculate on the subject, as there are so many ways by which a slight dash of Ryeland blood could be attained, without the aid of a direct cross with his subsequently far-famed and high-priced animals. Excepting for peculiar cases, I do not consider the Leicester is a sheep at all calculated to improve old California flocks, as compared with other breeds; though in certain positions of limited extent, such as the southern sea-board and islands, they may be found profitable as mutton, owing to their capacity of putting on flesh rapidly after the first flush of grass has put up. On one occasion, I noticed a very young sheep of the Leicester breed, in Washington market, San Francisco, on the stand of Mr. Barron, butcher, which weighed 95 pounds, though it could scarcely have been a year old. It was stated to have been brought up by by steamer from one of Messrs. Bolton & Barron's ra[illegible]es, in the South, and had merely been grazed in [illegible]e ordinary manner, without any special care or [illegible]dance.

THE LONG-WOOLED BREEDS — THE LINCOLN, THE COTSWOLD, THE NEW OXFORD, &C.

The old Lincoln and Teeswater breeds generally resembled each other ; the latter is probably extinct, and the former has given place to what is called the new or improved Lincoln. Both were large animals, producing a heavy carcass and great weight of wool. The most extraordinary instance of the latter which I ever heard was that of a single fleece weighing a "todd," (a term applied to a weight equal to twenty-eight pounds.) The breed just alluded to has given place to an animal that does not require such a length of time to arrive at maturity. This was partly effected by a slight admixture of New Dishley blood, but in a much greater degree by judicious selection. The Lincolnshire long-wools partake largely of the peculiarities of both Cotswolds and Leicesters, having the expansion of frame and noble appearance of the former, allied, in a great degree, with the quality of flesh, compactness of form, beauty of countenance, lightness of offal and inclination to fatten of the latter ; but they far exceed either in the weight of their wool. They are usually kept until twenty-seven or thirty-three months old, when their weight runs from twenty-eight to seventy-two pounds per quatrer ; and the weight of the two clips of wool amounts to from twenty to twenty-five pounds per head. A breeder in the neighborhood of Grantham exhibited a shearling sheep whose carcass weighed 22 stones (308 pounds,) or

77 pounds per quarter.* The wool not unfrequently obtains a higer price per pound than very fine Australian and equal to Saxon wool of second quality. A few years ago it was worth half a dollar per pound, and should it ever be grown in California as an article of export, the shipper may in general look for a net average return of from twenty to twenty-five cents per pound. Such huge fellows and heavy fleeces can, however, only be profitably pastured on rich and moist lands producing a rich, luxuriant herbage. If reclaimed, the tulé and tidal lands are such as perhaps could be most profitably employed in pasturing this species of sheep, when combined with a suitable admixture of horned cattle.

The Lincolnshire long-wool has a steadier demand than any other kind, and has possessed a marked character in this respect since the introduction of the Alpacca wool, and is employed in the manufacture of a somewhat similar fabric, well known amongst ladies under the name of lustres.

What are termed New Oxfords are simply the old Oxford sheep crossed with New Leicester and Cotswolds. Although rising in local repute, they do not possess any special merit sufficiently deserving to draw upon space already too limited to do justice to the important subject under hand. There exists one strong

* Since writing this, I have seen an authentic account, published in 1855, in which it was stated that a few years ago three Lincolnshire sheep were slaughtered, aged respectively three, two and one year, and weighing 386 pounds, 364 pounds and 284 pounds.

ground of objection to employing New Oxfords as a medium of improvement, namely, the very recent period to which they can date anything like fixity of form.

The Cotswolds are large sheep; they are superior to the New Leicester in hardiness of constitution, are more prolific, will sustain themselves, "by holding their own" or improving, on pastures and in severity of weather where the New Leicester would decidedly deteriorate. In suckling their lambs the Cotswold ewes are much superior to New Leicester. In this quality, and in being more prolific, the Cotswold ewes resemble those breeds which have been least indebted to the care of man. For districts in California where it may be desirable to possess a large, long-wooled breed, the Cotswolds will be found preferable to Leicesters. Some of the prize sheep have attained great weight—sixty-five to seventy-five pounds to the quarter, with fleeces of of twelve to fifteen pounds each. Perhaps the sheep now roaming over our northern and hilly districts could not receive a better cross than the Cotswold or the Cheviot. The Cheviot, when carefully bred, is a handsome, compact sheep, not quite so *leggy* as the Cotswold and Yorkshire sheep; notwithstanding which they are an active race, are famous foragers, and withstand the vicissitudes of weather exceedingly well, more so than any of the improved breeds. The Cheviots will be found most suitable for Washington Territory, Oregon, the inland counties north of Yuba, and the maritime counties north of Marin.

CHAPTER IV.

On Setting a Flock.—Explanation of the terms Setting a Flock and Breeding Back—Time as an element in forming fixity of Type—Remarks of the late Earl Spencer—Breeder ought to make up his mind on the special points he intends aiming at, and not to deviate therefrom—Breeding in and in.

The term "setting a flock" has been applied to the operation of improving, either by selection or crossing, or both, an already established race. Owing to what is commonly called "breeding back," an improver repeatedly meets with many disappointments. This "breeding back" is well known to the breeders of all species of animated nature, from dog, canary, poultry fanciers, etc., upwards, though perhaps it is most conspicuous in the vegetable kingdom, and is especially well seen in the Brassica tribe. The turnip seed-growers, in order to secure unmixed seed, are compelled to make arrangements to have *every* variety grown at a sufficient distance not only from each other, but also from the influence of any cabbage, cauliflower, rape, (whether wild or cultivated,) which may happen contemporaneously to be in flower, and sufficiently near to allow the pollen from the one variety to be wafted to, and thus impregnate that which was intended for select seed of one special variety possessing distinctive properties and characteristics. Whenever such an impregnation of the pistils takes place from the pollen of the stamens belonging to another variety

of the brassica tribe, the succeeding seed will be found productive of an almost endless variety of plants belonging to the same class, but possessed of properties wide asunder—from turnips to Kohl Rabi, from kale to cauliflowers. It is by the judicious impregnation of the flowers of plants that the scientific horticulturist has accomplished so many wonderful changes amongst our most common as well as esteemed flowers and fruits, as examples may be mentioned—the change from the apricot to the immense variety of plums, the almond to the peach and nectarines ; in fact, so great is the tendency to "go back" in some plants, that a like kind can never be depended upon for propogation by means of seeds, such can only be relied on by employing actual parts of the plant itself—as cuttings and suckers, the vine, the pear, etc., are illustrations of this. This recurring back, always more or less, towards the uncultivated original, is not so strong amongst animals as plants, and is consequently much more under human control ; it is, however, sufficiently difficult to require the aid of the minutest observation and discrimination, more particularly in seeing that male and female animals of the progeny of a cross are properly fitted to each other, as indicating that not only their own immediate, but that all their future descendants will be likely to transmit that type which the breeder is seeking to obtain or perpetuate. Of all the observations made, either by others or myself, it appears to me that one rule exists paramount to others, that is, the element of time in fixing the character of race. The

other elements as food, shelter, climate and soil, are of secondary consequence, which in time however, produce important changes—such changes so caused have, according to my observations, ever been more rapid in animals whose type has only been recently formed, as the New Leicester, when compared with such as the improved Southdown, which contains no mixed blood, which in a great measure is not an unfair representation of the original stock of short wooled sheep changed in degree by soil and climate. The Saxon,* the improved French, and other breeds of Merinos, are examples of the changes which have taken place in the original Spanish stock, from the effects of varied food, climate, shelter, etc. In the United States a further change has occurred, as may be seen by reference to the plates of this stock which are embodied in the present work.

I am indebted to Mr. J. M. Patterson, for pointing out me a very distinctive change which has taken place in the horns of the French Merino, as compared with its common progenitor, the Spanish Merino. It will be seen on comparing the cuts, especially that of the ram, that the horn curves close to the head backwards and downwards—whilst the Spanish Merino, (Infantado breed,) curves outwards. (See illustrations.) Mr. Patterson assures me this downward growth of the horn of the French Merino, is a special characteristic of the purity of French Merino blood.

Even when *setting a flock* from a common progenitor, two parties having different views may, and do some-

* An illustration of the rapidity of deterioration in a Saxon flock has already been previous given by Capt. Stanley Carr.

FULL BLOOD FRENCH MERINO SHEEP.

times, not only change the character of the two, as compared with each other, but both with reference to their common ancestors. The most prominent cases of this kind, as regards the New Leicesters, was formerly, and probably may still be seen, between the flocks of Mr. Buckley and Mr. Burgess. Both these flocks have been purely bred, from the original stock of Mr. Bakewell, for three-quarters of a century. Not a suspicion exists that the owner of either has deviated in any one instance from the pure blood of Mr. Bakewell's flock, yet the difference in the sheep of the two flocks is so great that they appear to be different varieties. This variation has resulted in consequence of the respective owners having pursued, with perseverance, a different system; one of them having aimed at attaining merits of one description, and the other having aimed at attaining merits of a different character.

Not to confine the example to the New Leicesters, it may be further mentioned, that of the some half dozen most celebrated breeds of improved Southdowns amongst which I will merely allude to the flocks of Mr. Jonas Webb, of Babraham: John Ellman, of Glynde; the Duke of Richmond; Sir John Shelly, Bart, M. P. for Westminster; although each symmetrically beautiful of its kind, yet when compared with each other present many features of difference; and it is known from experience, repeatedly tried, that the progeny of crosses between these high bred flocks have been productive of disappointment in all cases wherever a

marked point of difference exists between the male and female, notwithstanding each, standing alone, may appear perfection itself. Like in architecture, it would be as vain to endeavor to combine the massively simple and grand Doric with the graceful Ionic and florid Corinthian, each must stand on its own beauties; what is a decided merit and proportion in one species, if ingrafted in the other, becomes an unsightly defect.

Not only has time a marked influence in promoting the progressive improvement of stock, by stamping a greater fixity of type in the descendants of animals of high ancestry possessed of excellencies in common; but it has a further influence of a negative character; namely, the prevention or retardation of retrocession under changed aspects of climate, soil, or other influential cause. Again, to draw a parallel from the vegetable kingdom, it may be mentioned that it has long been suspected by botanists that all the varieties of wheat have been derived from Ægilops, which M. Esprit Fabre has shown, can in seven years, be converted into wheat. It is very doubtful whether any of the varieties of wheat, either by neglect or mere self-seeding, would within so short a period be converted into an Ægilops. So in the animal kingdom; the descendants of those breeds which have for the longest period retained valuable economical properties, whether as regards form or function, will retain the same for the longest period without decadence in circumstances unfavorable to their maintenance, and will

be the longest time in giving way to their changed position and reduced to what is termed a state of nature.

In a highly interesting paper which appeared in the first volume of the Journal of the Royal Agricultural Society of England, written by the late Earl Spencer,* it was well stated by that talented and worthy nobleman, that "the bodily and constitutional qualities of the offspring are usually similar to those of the parents, either combining in various proportions the qualities of both parents, or taking entirely after one. I should say, as respects cattle and sheep, that in most cases, the qualities of the male parent predominate in the offspring. I have also observed that the *worse bred the female is*, the more will this be the case, when she is put to a well-bred male;" which has been accounted for thus: a well-bred animal means one whose ancestors for several successive generations have all been good, that is, have all possessed the peculiarities in constitution and shape; which it is the object of experienced graziers to obtain in their stock. The *characteristic*, therefore, of the *family* of such an animal, will be such peculiarities; but the ancestors of a badly-bred animal will probably have varied in every possible way, and consequently there will be no *distinguishing* characteristic in its family. It is therefore most probable, that the offspring produced from a cross between two animals so

* On the Selection of Male Animals in the Breeding of Cattle and Sheep.

circumstanced, will be more like the one in whose family there is a distinguishing trait, than the one in whose family no such characteristic exists. The common, but I believe mistaken notion, that the offspring from the first cross is better than that from any subsequent one, probably arises from the improvement in the first instance being so much more apparent than, for the reason given above, it is likely to be in any one generation afterwards.

Before "setting a flock" in any locality, due regard should be paid to the soil, situation, and climate on which they are to be produced, as those alone should govern the decision as to what breed or description of animals should be propagated to produce the largest return. It is also requisite before any one commences the rearing of a breed of sheep, that the party makes up his mind what shape and qualities he wishes to obtain, and afterwards to steadily pursue this object; if he does so, there is very little doubt but he will succeed in obtaining a flock of sheep possessing the characteristics he intended them to obtain. If on the other hand, he breeds at one time with the view of obtaining animals possessing one shape, and at another time with the view of obtaining animals possessing a different shape, the probability is, that his stock will possess neither the one or the other in any degree of perfection. Having decided on the kind of sheep, care should be taken to select the best of that particular breed; this principle should be strictly observed in the selection of

females, but more particularly in the choice of males. Much depends upon the union, or knowledge of matching the male and female, especially if selected from different families, though of the same breed, which have been raised in other localities; and consequently influenced by climate, soil, situation, and treatment. The general opinion amongst English breeders is, that it is not advantageous to endeavor to correct any fault in the shape of a female, by putting a male to her who possesses an extraordinary perfection in the merit in which she is deficient, but who in some other part of his shape is faulty. This mode of correcting a fault is frequently successful, but it occasionally fails; the forms of the descendants in such cases should be carefully looked after, and if none of the defective points in the sire display themselves until the fourth generation, there need scarcely be further apprehension. It may however be observed, that there are exceptional cases, when both beauties and defects reappear at extraordinary distant intervals.

Of crossing and breeding in and in, it may be observed that generally much dependence cannot be placed on the former, and the latter is calculated to reduce the size of the bone, and consequently the general form of the animal. It is not found prudent, in general, to put animals of the same flock together, nearer than the third or fourth remove in the same line of blood.

CHAPTER V.

PROCREATIVE AND LAMBING SEASONS.—Salt supposed to induce abortion—The same effect presumed by the use of turnips—Presumed effect of alkaline soils—Period to select and mate animals to breed from—Period of putting the ram to the ewe—The lambing season ought not to occur in hot weather—Causes of abortion—Lambing—False presentations—Sheep and calves cordial—How to make at home prepared chalk.

It would have extended this work too much, had it contained any lengthened remarks upon the diseases incidental to, and the remedies required for all the various disorders of sheep. In fact I have not unfrequently, indeed oftener than the reverse, heard it stated, that sheep in California are not afflicted with *any* disease. The latter statement I *know* to be untrue, from having had a personal inspection of scabbed sheep, brought to San Francisco for slaughter. My own opinion of California sheep farming, extends only to observations made during various excursions during the last six years, extending from San Francisco to Watsonville, to San Juan and Monterey, and thence by a line extending north-easterly through Stockton to Sonora, Tuolumne county; thence through Calaveras and Placer counties. by Yankee Jims, Iowa Hill and Illinois Town to Nevada; thence westerly through San Juan North to Marysville; thence to San Francisco. Only two of these journeys were made in the winter, and one in the spring season, and those were taken almost direct

to the mountains, along the chief stage roads, and at seasons usually of no very critical moment in sheep husbandry. I have consequently viewed sheep farming in California under a rather favorable aspect; only on one occasion was the snow deep, and continued long on the ground. I have no doubt, however, that sheep farming in California will be found obnoxious to the evils incident elsewhere; though from the character of the climate and general dryness of the soil, they may, in most cases, be greatly mitigated.

As I do not, therefore, feel sufficiently acquainted with the maladies that may exist amongst sheep in this State, it would be idle to dwell thereon and to point out remedies for what may not exist, or which present such altered conditions as would require an entirely different treatment to that praticed in England. I am deterred, also, from treating on remedies for the maladies of sheep, and that might be allowed, as a conclusive reason, from non-acquaintance with the disorders just noticed. Another reason, however, of not less importance, prevented my doing so, namely, the desirability of putting the sheep farmer in possession of those remedies which the researches of modern science have put at his disposal; this I could not accomplish in the short time required to complete this work. On looking over the various books on Sheep, published in the United States, I have found nearly the whole, (the portions on the medical treatment of sheep entirely so,) copied from Youatt, whose work

appeared thirty-five years ago. Since that period the Royal Agricultural Society of England has been established, and in consequence thereof the world has been enriched by the able lectures delivered before that body by my friend Professor Simmonds. To make a large part of which sufficiently instructive to the reader, would have required expensive cuts, and the letter-press alone, would have exceeded more than is contained in the present volume. As, however, the treatment of the mother during the critical period of parturition, is so obviously one of the most important portions of the cares pertaining to sheep breeding, it could not with propriety be omitted; some remarks on the subject will also permit additional observations to be made as to the best time and mode of selecting the males and females most fitted for each other.

Before entering on the details of the subject which head this chapter, I shall make a few remarks respecting the use of salt. The use of this condiment has very properly been recommended for all domestic animals, and to none is it of so much importance as to sheep. That it mollifies the rot and some forms of braxy,* is proved by experience, and its proper use by the shepherd enables him to exercise a most commanding influence on the flock which he superintends. Experience has, however, shown that at one season of the year salt should be withheld from the ewe, that is, during the

* This is a name given to a variety of disorders incidental to sheep exposed to the bleak heaths of Scotland.

season of pregnancy. The late Lord Western was the first to observe the tendency to abortion produced on ewes when liberally supplied with salt. Subsequent observers have remarked effects of a like character. This opinion is the more confirmed from facts become patent amongst English turnip-growers; namely, the greater number of abortions among ewes fed upon turnips, as compared with others belonging to the same flock fed on different food. At a conversation held at a council meeting of the Royal Agricultural Society of England, it was suggested by my friend Professor Way,* that the abortions consequent on the use of turnips arose, probably, from the amount of salt consumed by eating these roots: as turnips, beets and carrots contain a greater proportion of salt than the grasses, clovers, and other ordinary pasture plants. I have made these observations in order to draw the attention of sheep farmers occupying ranches containing salinas, or what are often termed alkali soils, to observe whether abortions are more prevalent or not amongst ewes grazing on those kinds of lands; and if so, to remove them therefrom. At those times during the winter when, in consequence of lengthened rains or frost, the grasses have become scarce or innutritious, salt might most probably be given to other portions of the flock than ewes. Incidental to this subject, it may be mentioned that in parts of England, when it can be effected, it is custom-

* This talented gentleman was at that period Chemist to the Royal Agricultural Society of England.

ary when sheep are attacked by the rot, to drive them on to what are termed salt marshes,* when, if the disease is not too far advanced, they are found to recover. Should, as I strongly suspect, a large part of the mortality of sheep in California during unfavorable winters arise at the commencement of the season from rot, and afterwards from famine, it is possible that the former may be preventable in a great measure when resort can be had to feeding grounds consisting of saline or alkaline soil. The hint is merely thrown out without giving an opinion pro or con. It may, however, be well to mention that patchy alkali soils are usually formed owing to such portions being the lowest parts of the pastures, and become alkaline, or rather salty, from the fact that the soluble salts are drained into the hollows; in consequence of this inferior position they will always be the wetest whilst any moisture can be drained from the more elevated parts of the land, and may thus, probably, be a cause of rot, unless the herbage around is sufficiently saturated with salt. Before leaving the subject of salt, I may mention that according to all the observations made by myself, salt, when given to sheep, has the effect of making the wool finer, and possessing more of that peculiar softness so much desired by manufacturers.

The proper period for selecting to breed from is the clipping or shearing season. When the wool is cut off close to the animal's back, all defective points become

* Marshes reclaimed from the sea.

much more prominent; the owner can then, consequently, judge much better what male and female animals can be weeded out as unsuitable; and also be enabled to select and match those which are the most suitable to each other.

In the following remarks the writer presupposes that the sheep-breeder has made some arrangements for breeding other than allowing the rams and ewes to run at large. In the latter case no instructions are requisite other than those general ones relating to selection, which ought to be adopted at shearing time, at which period every lamb, be it male or female, ought to be culled out that has any evident or glaring defect. In case of males, the injurious effects arising from perpetuating such defect may be obviated by castration; if a ewe lamb, it should be sold before it becomes old enough to breed from.

I am quite aware that in the following remarks it implies a degree of advancement not commonly found amongst California rancheros; if, however, any improvement is to be attempted and rapidity of success desired or anticipated, it will become indispensably requisite for the sheep improver to possess some kind of enclosure both for ewes and rams. These may consist of earthen, stone, or quick fences, pens, or wooden hurdles. Whatever be the means employed, separation until such time as the farmer feels it desirable to admit the male to the female, and each to its pre-intended mate, is indispensably requisite, if a high degree of perfection is looked forward to in the progeny.

The ewe is sufficiently matured for breeding at from fifteen to eighteen months. The ewes should be kept in a pasture separate from the rams ; in this way the farmer can select his own time for putting the males and females together. In a general way it will be found most desirable that the bulk of the lambs should not be dropt until the severity of the winter season is over. In California this may, on the average, be reckoned as taking place about the vernal equinox (21st of March,) being earlier in the southern and later in the northern districts. In Spain thousands of lambs perish from cold and hunger ; so much so that it is usual to estimate one lamb to be suckled by two mothers. Every farmer must calculate the time best adapted to bring forth his lambs by his own experience, for the climates of California are so complicated that it is impossible to estimate them in the order usually established, namely, by the parallel of latitude and elevation above the level of the sea. There are climatic zones which possess meridional parallels, the eastern and western extremes of which vary in character in the inverse ratio of summer and winter, the former being hottest in summer and coldest in winter, whilst the latter possesses a comparatively warm winter and cold summer climate. An instance of this variability of climate, as opposed to what would be ordinarily calculated upon, I may mention that whilst writing this volume I was introduced to Mr. Davenport, who possesses considerable flocks of Saxon sheep in Colusi county. In the course of the conversation which

followed, I observed that Saxon sheep would no doubt succeed in Colusi county, if the Saxon mode of shelter was adopted. Mr. Davenport remarked that he should this year possess sheds extending more than six hundred feet in length, and that snow *never* laid on the valley where his flocks fed. This last remark particularly surprised me, because I have myself seen the Sacramento Valley, from below Marysville to Sacramento, covered with snow for some time during two winters. This discrepancy I can only reconcile from the circumstance that the greater breadth and elevation of the coast range intervening between the ocean and Colusi, intercepts the vapors from the Pacific, being deposited as rain or snow on the most elevated peaks of the coast range.

Hot weather may, however, prove detrimental to the mother as cold does to the offspring; therefore the lambing should not be put off to too late a period of the spring. Hot weather at the lambing season predisposes the ewe to dangerous forms of fever, which is promoted rather than otherwise by the abundance and luxuriance of the pasturage. A late dropt lamb has the disadvantage of not possessing an equal amount of time to grow strong enough to meet the inclemencies incident to the winter season, as compared with one that has been earlier lambed; nor has the mother the requisite time to recover from the impoverishing effects of suckling, and attain the necessary condition to enable it to pass through the like trying season. As the period of ges-

tation with the ewe runs usually from one hundred and fifty to one hundred and fifty-two days, it will be found best to put the rams to the ewes from the 7th to the 31st day of October. When it is desired to put the ewes to the ram, no further preparation is necessary than that of placing the former on some rather better pasturage than customary. High-bred rams are put with ewes whilst shearlings. The number of ewes with which such rams should be allowed to run, should be regulated by the apparent health and strength of the animal, and the pasturage on which he had been previously fed. Forty or fifty ewes may be considered a fair allowance to the shearling, and seventy-five or eighty to an older ram; indeed, the latter will serve one hundred, if a strong, healthy animal, and fed with about half a pint to a pint of grain or leguminous* seeds per day, the latter in preference. When the rams and ewes run at large, no directions need be given, only that there ought in such case be at least one ram to every forty ewes. There are few places, however, where enclosures may not be made to corral fifty to one hundred ewes, amongst which the ram could be put, removing one batch of ewes every four hours, and replacing them by another batch and another ram. In such case, before the ram is put to the ewes the under part of his brisket should be colored with ruddle†, in order that the flock-master may know which ewe he has served, which is shown by the red

* Peas, beans, &c., when very hard, ought to be crushed.

†Venitian red, Spanish brown, or any other similar substance will do.

mark he will in consequence leave on her back; this reddening of the ram's brisket should be renewed daily when the tupping is active. Such ewes as exhibit the red mark noticed, should be placed on a separate pasturage. Two good results are obtained from doing so; in the first place it prevents a needless strain on the ram if the ewes are efficiently served at first; and secondly, by putting a fresh ram amongst them at the end of every fortnight, it will be seen whether they are again in blossom. A fresh ram should always be employed for this purpose, as long observation has shown that it a ewe fails to be impregnated the first time by a ram, he rarely is effective on the second occasion. Ewes, if not impregnated, return in season at the end of a fortnight. When ewes do not return in season to bloom at the end of a fortnight, it may be concluded that they are in lamb; those which again exhibit symptoms of being in season at an interval of a fortnight after being served a second time, will most probably prove barren ewes, and unless required for some special purpose, may be drafted off, when fattened, for the butcher.

Little remains to be said about the treatment of ewes after the tupping season, as under existing circumstances they are not likely, in California, to be hurt by a plethora of food. The difficulty in this State at present will be the adequate maintenance of the ewe should the subsequent winter prove a pinching one. If possible, however, the ewe should be maintained in good condition, but not fat, for a fat ewe always produces a small

lamb ; besides, a fat ewe is less able to sustain the strain upon her nervous system at the period of lambing. It has already been noticed that the breeds of sheep least indebted to man for improvement, have a tendency to accumulate fat within, in place of the exterior parts of the animal. The consequences of overfattening such ewes are therefore to be the more avoided, in order to prevent the diminution of size in the progeny arising from this circumstance. Notwithstanding the inimical effects arising from overfattening, it is very desirable that the ewe should, during the autumn, be maintained in good condition ; and this can always be done under anything like fair treatment, owing to the tendency of all females belonging to the Mammalia to improve in condition and put on fat during pregnancy. The female sheep is consequently endowed by nature with a property of preserving itself from perishing during adverse winters beyond that of the male ;—a wise dispensation of Providence for the preservation of the species, forming another of those beautiful adaptabilities to circumstances already noticed, which are so common to this animal.

The rams having been finally parted from the ewes, although not requiring that active attention that they do at other seasons, should still be cared for. One general and important rule is that they should be kept as quiet as possible. One of the principal evils to be dreaded is that of premature labor. Abortion is not so common with the ewe as the cow; there are, however, oc-

casional instances of it. The causes are various, and some of them of a very opposite nature. Starvation is one cause, and probably the least preventable of any in some parts of California during adverse winters. A not uncommon cause arises from intercourse with the ram after the ewe is far advanced in pregnancy; hasty and incautious driving, especially as the lambing season approaches, is another cause.

Few symptoms designate the approach of abortion in sheep until it is too near to be prevented. A degree of dullness and disinclination for food; a frequent or almost continual bleating, followed by the discharge of a glairy yellow or red and fœted discharge from the vulva, will sufficiently indicate it. In cases of abortion the lamb is almost always dead, or if alive it invariably dies soon afterwards. If the fœtus has been long dead, which is indicated by the putrid smell arising from it, the parts should be carefully washed with milk and water blood warm, and afterwards with a very diluted solution of chloride of zinc, some of which, if very dilute, may be injected into the uterus if made blood hot, that is, 98 to 100 degrees of Farenheit's thermometer.

LAMBING.

As the period of lambing approaches, the ewes should be removed to some fair but not too rich pasture, as near to the homestead or headquarters of the ranch as can be made convenient. Few ewes sink under the labor of parturition, unless half starved, and it is seldom

that nature fails to supply the mother with sufficient nourishment for her young during the first few days, and will never fail to do so if the dam is afterwards reasonably fed, so as to meet the increasing draw on its system in supplying the growing wants of its progeny. After the lambs are dropt, the ewes should be carefully driven into an inclosure, when the shepherd with a pair of shears should remove the hair from beneath the tail and inside of the thighs, also around the udder. With out this care, termed "clatting," many lambs would be prevented from sucking its mother, owing to the filth and dirt which accumulates around those parts. After the clatting, the lamber will be the better able to distinguish the ewes that have lambed. This is a matter of some consequence, for it will not unfrequently happen that the young ewes will desert their lambs, and graze amongst others as careless and indifferent as if nothing had happened. Barren ewes will also be more readily detected and separated.

Prior to the time of lambing, the shepherd should carefully observe every ewe that may appear to be in labor. While she walks about and does not exhibit any extraordinary degree of suffering, she should not be interfered with; nor should this be attempted if she rise when approached and walks away, unless labor has been protracted twenty hours or more. The party in care should not be in haste to render his assistance, notwithstanding the ewe should be continually lying down and getting up again, displaying more impatience and irri-

tability than actual pain ; should, however, her strength appear to be declining, immediate aid is required. The early interference of the lamber is always prejudicial, and not uncommonly fatal. Nature, in the majority of cases, will in the course of twenty-one or twenty-four hours accomplish that which cannot be hurried on by art without extreme danger.

The state of the weather will sometimes cause a considerable difference in the duration of labor. When the weather is cold and dry, especially if the situation is somewhat exposed, the progress of the labor will be slow, the throes comparatively weak and ineffectual. The ewe may and should at such times be left a considerable period before mechanical assistance is rendered. When, however, the weather is warm, and especially if at the same it is moist, the throes will be violent, and the strength of the sufferer will rapidly waste, accompanied with a dangerous tendency to inflammation, the aid of the lamber is speedily required. Excepting under these circumstances, no motive of curiosity, no desire to know how the affair is going on, should induce the lamber to interfere while the throes are natural and the strength continues, unless it is evident, without handling the ewe, that a false presentation or some mechanical cause prevents the expulsion of the fœtus. When the ewe is nearly exhausted, she will often suffer the lamber to kneel beside her and successfully afford the required assistance. If there is a violent struggle between the patient and the lamber, the fœtus will

often be destroyed ; but his help, when she quietly submits to him, will rarely fail to preserve the mother and offspring. When assistance is deemed immediately requisite, the first thing is to endeavor to ascertain the nature of the presentation, and to carefully examine if the lamb is coming the right way, with its muzzle first and a fore foot on each side of it. If the tongue is not protruding from the mouth and becoming almost black, and her strength is not wasted, a table spoonful of cordial with double the quantity of infusion will probably increase or recall the pains, and the lamb be soon expelled. If this should not be effected in a quarter of an hour, a second dose of the infusion should be given ; the last not being followed by any good result, mechanical assistance must be tried. The lamber should first draw one leg and then the other, endeavoring at the same time with his finger to solicit or coax the head onward at the same time. If he cannot readily get at the legs, he should push the head of the lamb a little backward and downward, when he will probably be enabled to grasp them. If this does not succeed, the cause of obstruction will be the great largeness of the head, which cannot readily pass the arch of the pubis ; in this case, either by tying the legs of the ewe or an assistant holding her down on her right side, the lamber should grasp the two forelegs in one hand and with one or two fingers of the other, introduced into the vagina by the side of the head, urge it forward with as much force as is consistent with the safety of the lamb. The young one scarcely fails to be extracted by these means, unless the head very much exceeds the common size.

False presentations are not numerous with the ewe, and are usually accounted for with tolerable readiness. The most usual false presentations are: the side of the lamb pressing against the mouth of the womb, which can easily be detected by feeling the ribs; or the back, when the bones of the spine can scarcely be mistaken; or the breech, when the bones of the haunch will be immediately recognized. The hand, previously oiled or greased, should in such cases be introduced into the vagina, and the fœtus being pushed a little back, one of the legs will, probably be felt, and may be easily drawn into the passage. Being held there with the left hand, the corresponding leg must be got at likewise, and brought into the passage; after which the delivery can generally be effected without much additional trouble. The most dangerous presentations, and the most difficult to manage, are the crown of the head and the breach. In both cases, the lamb must be pushed back into the womb. The head must then be raised with the fingers and brought into the passage, if the former case; and if the latter, the lamb must be pushed far enough into the womb to enable the attendant to bring down the hind leg—a work not easily accomplished, or to be accomplished at all, on account of the manner in which they are extended under the belly. The principal loss in lambing is to be traced to one or other of these presentations, chiefly to the latter.

The lamb having been placed in its natural position, and the labor pains being strong, much must be left to

nature. The strength of the animal being supported, and the pains rendered more regular and effective by small doses of ginger and the ergot of rye; the position, however, being unnatural, manual assistance cannot be too early afforded. The lamber should not use more force than is absolutely necessary in order to draw away the lamb. Yet, a considerable degree of it may be quietly employed without endangering the life of either the mother or the offspring. If the ewe is nearly exhausted, the application of force is imperiously required.

Difficulty sometimes occurs in the case of twin lambs. They may both present at the same time, either naturally or otherwise. In such case the one that has least advanced must be returned, and the other extracted as soon as circumstances will permit. The lamb that was returned may then be left to nature's effort, and will shortly be delivered.

As soon as it can be ascertained that the lamb is dead within the mother, means must be taken for its extraction. Instances have been known in which the dead lamb has been retained in the womb during a considerable period of time, or even during the life of the mother, but they are rare. The animal never thrives, and in the majority of cases has pined away and died. The fœtus may in such cases be sometimes extracted by the hand; at others, a blunt-pointed knife, and an instrument somewhat resembling a large button-hook are necessary.

SHEEP AND CALVES' CORDIAL.

This useful medicine having been alluded to, it may be as well to conclude this chapter with a note respecting its preparation, as it ought always be on hand at every ranch where sheep or cattle are kept. It is particularly useful when violent purging takes place, as in diarrhœa and dysentery. The recipe is as follows: Take of prepared chalk one ounce, powdered catechu half an ounce, powdered ginger two drachms, powdered opium half a drachm; mix these with half a pint of pepperment water. The dose is from one to two tablespoonsful morning and night for a lamb, proportionably larger for a sheep or calf, according to their respective ages. Should the purging prove obstinate, it will be advisable, provided a foster mother can be obtained, to remove the lamb—the cordial being continued as before until relieved.

Rancheros being usually at a considerable distance from drug stores, it may be well to show how he may prepare this remedy in a cheap and expeditious manner. The catechu, powdered ginger and opium he ought to purchase in quantity, and place in well stopped or corked bottles, such as pickle bottles, together with a small quantity, say half an ounce, of the oil of peppermint: five drops of the oil may be dissolved in one wine glassful of alcohol, which may be mixed afterwards with the powdered ginger and opium. The chalk, prepared as

will be immediately shown, and the powdered catechu should be well mixed in a wine glass of water; the whole may then be put together and well shaken: the shaking being repeated every time the medicine is used. As prepared chalk is an expensive material, and after all is simply carbonate of lime, the following recipe is given for preparing it at home:

Take a lump of well burned lime and slake it with an excess of hot water, stir it well and let the coarser parts settle, drain the finer parts and let it settle, drain the water from the finer parts, dry the latter, and pound it fine; then expose the same on sheets to the action of the atmosphere for ten days or a fortnight, stirring it daily, when it will be sufficiently carbonated for use.

CHAPTER VI.

THE GROWTH AND MANAGEMENT OF WOOL.—Changes produced by domestication in Sheep—-Connexion of the Sheep and Goat—Observations of Mr. Robert Smith—English practices not the best adapted to California, in its present condition nor immediate future—The Yolk—Adjuncts to replace the want of Yolk—Salving bratting.

The most remarkable external change which domestication is supposed to have produced on sheep, is the conversion, as it is usually called, of hair into wool; or to speak more accurately, the prodigious development of one of the constituent portions of the coat, and the decrease or disappearance of the other. I have purposely stated that domestication is *supposed* to have had the effect stated, in deference to other writers who positively assert such to be the effect. My own opinion is that domestication has little to do with the matter other than whilst under the care of man; sheep are more generally cared for, and provided with artificial or reserved food, which in severe (generally winter) seasons, the animals could not obtain themselves—certainly not in the same abundance. It is this additional aid to their food, to which is occasionally added more or less opportunities of shelter, that sheep in cold climates have woolly coats in place of hairy ones; wherever sheep are exposed to a very low temperature, especially if accompanied by much moisture, the larger part of its covering will become changed into hair,

kemps—whilst the remaining wool will assume a harsher and less curly character. The conversion of wool into hair on sheep transported from a cold and temperate climate to a tropical one, is a change well known, but in this case it is not accompanied by the fine curly undercoating, observable when the wool is changed for hair on sheep transported from a temperate to a cold climate. Although it has been noticed that sheep taken from a temperate climate to a cold one, has a portion of its wool replaced by kemps, or hairs, there always exists a fine coating of curly wool underneath, we find, however, that the goat under similar circumstances, such as those occupying the cold and elevated table lands of Thibet, have a portion of their hairy covering converted into wool; it is this beautiful under covering from which are manufactured the splendid shawls of Cashmere. Both of these apparent inconsistencies are only examples of those beautiful adaptabilities which Providence has kindly endowed, in a greater or less degree, almost every species of animated nature. When a fine fleeced animal is removed from a temperate to a cold, moist one—for the two are most commonly the accompaniments of each other—it is requisite for the animal's preservation that the locks should be opened, in order the better to permit the rain to fall off, and at the same timebe more accessible to the sun and winds, after the showers have passed away. This would not, however, be sufficient to preserve the animal placed in such situations, for it is not only requisite that it should be preserved from perishing owing

to wet, but also from lowness of temperature even in a dry atmosphere.

The temperature of the blood of the mammalia may be assumed, as a general rule, to be about 100 degrees of Farenheit. It is well known that mountain sheep are not unfrequently compelled to endure a cold upwards of 20 degrees below freezing point, or 120 degrees below blood heat, and if the animal was not protected in some mode or other from the extraordinary drain of animal heat which would take place under such circumstances, it would speedily perish ; to prevent such a catastrope, nature has in such cases provided the animal with the fine fleecy undercoat already noticed. In the same way the goats of Cashmere are enabled to endnre the continuous and intense colds of the elevated plateaus which they occupy, owing to the fine fleecy covering with which they are furnished. When, however, a sheep is transported from a temperate region to such intensely hot regions as the districts around Carracas or Venezuela, they require no such protecting under fleece ; it consequently entirely disappears, or is reduced to the merest rudiments, requiring microscopic aid to discover them. The hair answers every purpose.

It will not be here out of place, after the illustration given, to again allude to the connexion between the sheep and the goat. Although that invaluable animal and the goat are usually regarded by naturalists as being not only specifically but generically distinguished, the latter, or generical separation, is founded chiefly upon characteristics which, most probably, have arisen

in consequence of the influence and power exercised by man. In a state of nature a sheep is not less active and energetic than a goat, its dimensions are fully greater, and its muscular strength is at least equal, both in force and duration. It is also an alpine animal, fearless of cragg and cliff, and dwelling sometimes by preference among the steepest and most inaccessible summits of lofty mountains. Among its native fastnesses it is said to bound from rock to rock with inconceivable swiftness and agility.

The form and structure of the sheep in its natural and unsubdued condition, differ in few material points from those of the goat. The skeletons when compared together present no points of difference which pass beyond the range of merely specific distinctions: their digestion and other systems are equally conformable. It is known that hybrids or mixed breeds have been produced between the goat and the ewe, and between the ram and the she-goat; and it has been asserted that these mule animals themselves have not, as usually happens, been unproductive; a fact, if true, that would prove a closer relationship to exist between these species than that between the horse and the ass. Besides, the hairy covering which gradually takes the place of wool as an outer protection of sheep, thus retrogading to the goat type, as well as change in form, which becomes gradually less symetrical; the fat which in the highest cultivated species of sheep, is found deposited on the exterior parts of the body and intermixed with the larger muscles, becomes less observable, and is

found in the greater part around the kidneys and intestines as the sheep degenerates to the wiid state. Accompanying these outward and internal changes a chemical alteration takes place in the character of the fat of the degenerating sheep, which gradually acquires a larger amount of hirsic acid, and has less olcirie, as compared with the fat of improved and early fattening varieties, thus approximating to the character of goat's fat.

Mr. Robert Smith, a gentleman known to me not only by his writings but also from personal interviews at the Council Meetings of the Royal Agricultural Society of England, each of which have impressed me with a high opinion of his intelligent and observant character, in an essay written by him on the Management of Sheep, which obtained the prize of one hundred dollars offered by the Royal Agricultural Society of England, observes :

"From close observation I have found the quality and quantity of wool to be governed by the quality or description of flesh upon the animal : hence certain wool and certain mutton go together : further, so often as the wool is observed to change upon the back or otherwise of the sheep, so does the quality of flesh change, commencing at the exact division of the varieties of wool—thus showing the importance of selecting those animals that possess the best description of wool and mutton. All these carry but one sort of wool upon their frames, and that of a mellow, moderately long, thick, bunchy character, under which is found the mutton flesh peculiar to first-rate animals ; which flesh is

found to spread or expand itself more rapidly than any other, but with a sufficient degree of firmness. Under short fine wool is found extra firm or hard flesh, which does not expand or grow in proportion. With thin-set strong wool we find the animal to have a wide objectionable head, with loose or coarse-grained flesh, wanting in quality in due proportion to the wool it bears; and the animal is never, in consequence, known to spread wide, but represents its degree of fatness along the back. In the selection of the male animals, it is even better to choose a strong animal from a well bred flock of the same family, than to step out of "the line" to cross with a large sheep of inferior blood, as practice has shown that the produce from a large inferior-looking sheep selected from a pure-blood flock, has been far better than those produced from an apparently good sheep selected from a cross-bred flock." Almost wholly agreeing with the preceding remarks of Mr. Smith, I shall for the present merely observe that whilst correct in a great measure as regards English husbandry, they do not wholly apply to California, especially in its existing condition. Another occasion will, however, arise to refer to them, which I shall do when I discuss the question of the fineness of the wool as connected with early maturing qualities of sheep. As an illustration of another subject, I shall again quote Mr. Smith, who observes: "Such is the effect of soil and situation, that when animals have been equally divided and kept apart for twelve months, upon opposite soils, they have scarcely resembled each other when placed together

again, beyond the family head." Mr. Smith also remarks: "The crossing of *pure breeds* has been a subject of great interest of late amongst every class of breeders. While all agree that the first cross may be attended with good results, there exists a diversity of opinion upon the future movements, or putting the crosses together.

With the exception of the *old* Merino and Ryeland, which are pretty nearly the types of each other, especially so when picked animals are chosen as the representatives of each, all the very fine-wooled breeds at present known are most awkward-looking, unthrifty animals. This remark applies to the Saxon-Australian and French Merinos, whether the native animal or of American rearing. Mr. Howitt, in his usually graphic style, well describes the German Merino: "One thing which surprises an Englishman is to see what wretched creatures are the sheep which produce the famous Saxony wool. In fact it is a prevailing idea that the leaner the sheep the finer the wool. It is the wool to which all the attention of the grower is devoted, and therefore, generally speaking, a more miserable assemblage of animals than a flock of German sheep is not to be seen. On the plains they wander under the care of a shepherd, and for the most part on fallows or stubbles, to pick up odds and ends, rather than to enjoy a regular pasture. You may see them penned on a blazing fallow, where not a trace of vegetable matter is to be seen, for the greater part of a summer day, which, in this climate, is pretty much like being roasted alive." Whether

there exists a real or it is only a fancied necessity that in order to enable sheep to grow fine wool, they must first become frightful starvelings, is a question, perhaps, difficult to decidə ; whether an altered mode of management could not compensate somewhat in degree, if not altogether, for this miserable, half-starved system of management, or rather mismanagement, I am not at the present moment prepared to offer a decisive opinion ; yet I cannot avoid expressing a very strong belief that there does not exist any such necessity. On the contrary, that the ungainly, gaunt appearance of these sheep is the result of neglect ; rather than that fine wool can only be raised from uncouth animals. It is probable that at a future part of this work an endeavor will be made to explain this apparent coincidence of fine wool and ugly carcase ; to do so at present would interrupt the course set out. If, however, this little volume should meet with sufficient patronage to justify to publication of another edition, I shall endeavor not only to set forth the probable reasons of this remarkable coincidence, and also adduce others to show that the same may advantageously be obviated.

THE YOLK.

The substance known as the yolk possesses an extraordinary interest to such as purpose raising the fleeces of their flock to the highest standard of excellence. According to my own experience this peculiar substance makes its appearance most abundantly in the American variety known by the name of the French

Merino ; next in the Spanish, Australian and German, in the order set forth. Such American-French Merinos as I have seen grazed in California possessed this quality in a most marked degree, accompanied, however, with a very great amount of free grease. The yolk which derives its name ftom its consistency and egg-like appearance, has usually been supposed to exercise a favorable influence on the quality of wool in consequence of its softening character, similar to that of oil on leather. The opinion of the writer is that it performs a double function, namely, that of nourishing the root of the pile in the first place, and subsequently preserving the elastic, softened character of the staple, owing to its ameliorating influence. These properties will be better understood when it is stated that the yolk is chiefly composed of a potash, or what is generally known as soft soap, intermixed with some free fat, or rather oil, and small amounts of carbonate, chloride and acetate of potash, with a little carbonate of lime, probably in the form of earthy soap,—thus giving greater consistence to the yolk, and not improbably its color. When there is a deficiency of yolk, the staple of the wool is dry, harsh and weak ; the entire fleece becomes thin and hairy. In cold, northern countries, when the yolk is in deficient quantity, it is not unusual to smear or salve the sheep about the month of November. This is a practice well known in the north of England and Scotland. The salve or mixture is usually American tar and damaged butter, or fat grease of any sort ; sometimes oil is used. I shall omit a descriptive account of

the mode of laying on the salve at present. I will, however, in a future part of this paper point out when salving might probably be useful. There can be no doubt of the benefit of salving ; all experience has shown in cold climates that the wool upon a smeared sheep grows much faster than upon those that are not salved ; the wool of the former feels warmer and much more kindly to the touch. Mr. Boyd, in a prize essay which appeared in the Highland Transactions relating to this process of salving, states : "I am decidedly of opinion that however perfect the structure of wool may be if produced in the absence of an oily or saporaceous substance, it cannot possess the requisite properties of a clothing material." As a remarkable instance of this, Mr. Boyd relate that "Mr. Shepherd, late of Kirktonhill, parish of Channelkirk, purchased from the Duke of Athol a number of Merino ewes and tups, the former at £13 sterling, the latter at £26. The first clip was partly grown in Spain and partly in Scotland. The wool was of the most beautiful description, and when manufactured into cloth the result was most satisfactory. The second year's clip was fabricated into the same description of goods as the first, but on account of the wool having in a great measure lost its felting properties, the result was anything but satisfactory. For several years after, the clip was manufactured into flannel and hosiery yarns, for which purpose the material was found admirably adapted. A sample of the first, second, third and fourth years' wool was carefully preserved, and at the request of Mr. Jarvis, the Treasurer of the

Highland and Agricultural Society of Scotland, each sample was separately examined, under the skilful management of an eminent optician, with a powerful microscope. After having repeatedly examined the various samples of wool, not the slightest difference could be discovered in their structure. In its manufacture, however, it was proved beyond doubt that the felting properties of the second, third and fourth years' wool were most materially diminished. It was quite obvious to the unassisted eye, that the first clip had been much more copiously supplied with yolk than any of the others ; to the diminution of this secretion was generally attributed the falling off of the felting or milling properties. During the time the Merino sheep were in the possession of Mr. Shepherd, which was from 1809 until 1818, they throve exceedingly well ; and it was the opinion of the shepherds in that neighborhood that if they had been smeared, they would have suited that district of country uncommonly well.* At Mr. Shepherd's sale Mr. Borthwick, of Crookston, became the purchaser of the Merinos in question, and, strange to say, the very first clip produced upon the banks of the Gala the fleeces were found to be mixed with innumerable brown hairs of a spiral form, which measured more than double the length of the wool, and in a few years the brown hairs were so numerous that it became impracticable to manufacture the wool into any description of goods until previously rolled into small bundles and chopped

*In this opinion the author of this book does not concur.

with a knife." It may be observed that the locality where these Merinos were first domiciled was on the English borders, where the climate is not only milder but very much drier than the greater part of Britain, notwithstanding which, deterioration is seen to have taken place ; a removal, however, to another position still farther north, and possessed of a more humid and cold climate, hastened the change from a woolly to a partially hairy covering, forming a remarkable instance of the wonderful adaptative power existing in life to meet climatic and other changes.

I conclude this chapter by a few remarks on a subject already alluded to, namely, the practice of smearing, as it is possible that salving sheep, under proper conditions, may prove advantageous to California sheep owners, especially so to those whose ranches may possess an upland or or elevated character, or resident in the northern portion of the State. Perhaps, however, it may be more particularly applicable to the position of sheep farmers in Oregon, Washington Territory, or Vancouver's Island. Smearing, as adopted in the North of England and Scotland, consists in rubbing on the back of the sheep a species of ointment composed of tar and some common kind of grease ; American tar is preferred for the purpose. The usual proportions are eight pounds of tar to six pounds of rancid butter, well intermixed until they form a fluid ointment. The smearer commences operations by dividing and opening the fleece along the back of the sheep, laying the skin bare ;

he then dips his finger into a pot containing the ointment, and by drawing the finger along the skin thus bared, a portion of the ointment becomes fixed on it. This being finished, he opens the fleece in like manner adjoining to the part that he first operated upon, and lays the mixture on the skin in the same manner; and so on until the whole side of the animal has been similarly treated, after which he proceeds in like manner with the other side. The cost averages in England from nine to twelve cents per sheep. The practice has been decried by some; amongst others by the Ettrick Shepherd; the opinion of the latter being that if sheep are supplied with a sufficiency of food, smearing will be found unnecessary. That abundance of food will in some degree counteract the ill effect of severe cold is perfectly correct, but I know from no small amount of experience that if sheep occupying inclement, mountainous districts are not smeared, and the winter season proves inclement, the worst results to both animals and fleece have followed.

Few would be more disposed than myself to pay deferenee to any opinion given by the Ettrick Shepherd, whose works, whether in prose or verse, display a comprehensiveness and acuteness of intellect of the highest order.* Still, it must be rembembered, that the Ettrick Shepherd spent the greater part of his shepherd life in the comparatively sheltered district of Yarrow. The

* As an instance of beautiful and true descriptiveness, may be mentioned, his truthful account of shepherding during a snow storm.

highest hill in Ettrick only reaching 2,200 feet, whilst the vales are somewhat sheltered and warm.

The evil effects of smearing arise from its staining the wool, to prevent this effect numerous substitutes have been proposed, but none on trial in mountain districts have proved so effective as tar and grease; it appears to me that this old-fashioned substitute or aid to the yolk, for it is replacing the deficient amount of that substance that its benefits chiefly depend, may by the aid of modern chemistry, be so improved as to lessen, if not altogether prevent, any loss in the operation, so far as coloring the wool is connected therewith. Should such an opinion prove true, it might be found desirable on those parts of the Northern Pacific coast, where snow or frost establishes themselves for any lengthened period, to employ some similar agent, in order to sustain the animal from the effect of excessive cold, and thus promote the growth of the fleece during the vicissitudes of the winter seasons.

In the districts where smearing is adopted, it is usual to commence operations the latter part of October or the beginning of November; as smeared sheep suffer very much from the effects of cold, if frost sets in prior to the wool having risen from the skin. After the wool has risen from the skin the animal does not suffer; from the time of smearing until *the rise* takes place, a fortnight generally elapses. Respecting the benefit derived from smearing, I may repeat what Mr. Boyd, who has already been quoted, states. Mr. B. observes, that "from a given quantity of salved wool, I have *invaria-*

bly found that a greater number of yards of cloth can be produced than from unlaid, and upon examination will be found superior, both in quality and make. Unlaid wool, however fine, if produced in this country, (Scotland,) can with little propriety be appropriated to the fabrication of cloth, where the felting properties are required.

BRATTING.

This is a means of protecting sheep from the inclemencies of adverse weather. Until engaged in searching statistics and other matters for this work, I was under the impression that it was first introduced into Scotland; nor am I aware of any other country in which it has ever been generally practiced.* In Scotland the use of brats on some farms has been firmly established, and as there exists every reasonable ground for believing that this mode of protection is founded on a rational theory, a probability exists that time will see it gradually extended. Bratting appears to me the readiest mode by which the California sheep owner can obtain the shelter needed during the brief, but sometimes severe weather, which occasionally takes place in this State. On this subject, Mr. M. Turk observes in a prize essay on the

* The "pellites ovibus," mentioned by Horace, Ode VI., book 2, are understood by his commentators to mean, sheep covered with skins, to preserve their fleeces from the weather. Varro seems to mention the custom, distinctly. Lord Clive, the celebrated conqueror of India, was, I believe, the first to try the system of bratting in modern times.

Protection of Sheep, that "after exhausting every practicable means of yielding protection and shelter to sheep on the hills, by the erection of stalls, etc., it was still found that a more constant and effectual method was necessary, and salving was resorted to, as the cheapest and most likely way of attaining three important objects. namely: defence from the cold, security from the ravages of the scab, and the destruction of vermin. It has long been known to those interested in the management of sheep, that more protection is afforded by bratting, than the use of any salve." "We have found from our own experience, (says Mr. Turk,) and we have not heard the fact doubted by any one conversant with the management of sheep, that no salve hitherto tried has afforded a protection equal to bratting; under this treatment, the flock will be in higher condition, and if so, the clip of wool will be greater and the loss by death will be considerably lessened, and affords the means of bringing some of the more reduced of the old ewes through the winter, which could not otherwise have survived in a high and exposed district. When the brat is taken off in April, the wool will be found to have retained the yolk, and will appear quite yellow. When examined, it will be found to be soapy and sound, and free from the defect which woolstaplers call husky and pinny, that is, dry and brittle, which occasions much loss in the manufacture. When washed, its lightness is unimpaired, in fact rather increased, owing to the soap employed in the bathing and the yolk which is retained.

Mr. Boyd has observed regarding the brat, that it is the rarest occurrence that a kemp hair is found in the fleece. Under its covering, the fleece is not only free from impurities, but possesses in an eminent degree felting properties; and from its extreme pliability and rich silvery appearance, it is found admirably adapted for the white of any mixture, particularly that of cloth. Indeed there is no other description of wool produced in Scotland nearly so well fitted for the purpose. When British skin wool, or fleece produced without any greasy or saponaceous substance, is used for the white of a mixture in cloth, I have almost invariably found it to rise from the surface, indicating its unfitness for that species of manufacture." Cloth suited for making brats can be manufactured from the refuse wool of the coarsest woolen manufactures. When intended to be practiced, the following general rules may prove of service. In place of fitting the cloth to every sheep, the best plan is to select a sheep of the average size of its class, as ewes, hogs, lambs, &c., afterwards measure and cut the quantity of cloth required. When the cloth has been applied to the animal and its proper dimensions ascertained, the parts should then be marked to which the different straps and strings are to be sewed, to hold it in its proper place. A strap is fixed to one of the front corners, in a direction to pass beneath the throat, and be sewed to the other corner; other straps are made to pass under the belly. These straps are only sewed at first at one end; the other end is sewed after the brat is fitted on, so as to keep it tight in its place. The

straps should be made of a soft and somewhat elastic material, in order that they may not chafe or injure the skin when the sheep is moving about. Perhaps the cheapest brats that could be made in Southern California would be of common sheepskins, waterproofed.

I shall close this chapter by earnestly enjoining on the sheep farmers never to shear lambs nor sheep more than once a year, and that always at as early a period as possible after it may be safely assumed that the rainy season is over. Should a mistake occur on this point, any damage may be prevented if the system of bratting is adopted, for according to my own experience, which has extended to six years, no danger would arise after April has expired ; for although tolerably heavy rains have occurred in May and even June, accompanied by cold winds on the coast range, I have never witnessed these inclemencies so great as to be likely to injure sheep ; especially as at such seasons and under such circumstances, there always exists an abundance of pasturage.

CHAPTER VII.

THE QUALITIES AND USES OF WOOL.—Characteristics of good Wool—Of the staple—Different qualities of Wool on various parts of Sheep—Carding Wool—Combing Wool—Serrated character of Wool—Felting properties—Table of fineness—Prices of different species of English Wool in 1858 Fine wool hats—Miners' hats—San Francisco and Mission woollen mills.

Good wool should have these properties: The *fibre* should be of uniform thickness from root to point, when it is said to be true; the finer the wool the smaller in diameter it is; it should be elastic on being stretched longways; tough, not easily broken; its surface should have a shining silvery lustre; it should be of great density.

OF THE STAPLE.

All the fibres should be of the same length, otherwise it will be pointed;* the end of the staple should be as bright as the bottom, and not seem composed of dead wool; the entire staple should be strong; it strength may be tested in the following manner: Take the bottom of the staple between the finger and the thumb of the left hand, and its top between those of the right; the wool must be thus held tight and moderately stretched; when thus held, let the third finger of the right hand play across the fibres. If the sound pro-

*Lamb's wool is usually pointed.

duced by this action prove firm and sharp, and somewhat musical, the strength of the wool is without flaw.* The sound will vary in intensity according to the fineness of the wool—coarse Lincolnshire yielding one much louder than Electoral Merinos. In proportion, however, to the diameter of the wool, the latter yields a stronger sound than the former, owing to the greater density of fine wool—in all cases where animals yielding the latter have had fair treatment as regards food and shelter. If the fibres do not break on repeatedly separating the hands by jerks with a force proportioned to the strength of the wool, the staple is sound. If they break, the wool is unsound—the staple will always break at the place which issued from the skin of the sheep, when it was stinted of food, had some disease, or exposed to inclement weather, whether arising from rains or lowness of temperature. It will not break at two places simultaneously; this has to be tried more than once, because whenever any of the causes named have occurred like results will be found to have followed; so that it sometimes happens, if the sheep have been diseased and badly kept, two, three or more such weak points will be discovered by carefully examining the staple. Pliability is an important property in the staple; inflexibility and brittleness are bad qualities.

A good fleece should have the points of all its staples of equal length, otherwise it will be a pointy one. The

* It requires some practice to acquire this art when the wool is very fine. With English long wool it is easy enough to accomplish.

staples should be set close together; and the fleece should be clean. A pointy, watery, or dirty fleece is the cause of much waste to the manufacturer, in order to bring the wool to a proper state for his purpose. One of the most desirable properties of wool is softness. Generally speaking, California fleeces tend towards, rather than from, this quality; unfortunately, however, in many cases marred by the rotten, dirty, and uneven quality of the staple, owing to exposure to the vicissitudes of the weather and want of food. This softness does not depend on fineness of fibre, but on an inherent elasticity like that of india-rubber, which, although yielding to the touch, immediately recovers its original form on the force which withheld it being withdrawn. There should be no hairs in wool—no long ones which are easily distinguished from wool, which, when present, have obtained for such fleeces the name of bearded; nor short ones, soft and fine like cat's hair, which are called kemps. The long hairs are frequently of a different color from the wool. The farmer who breeds sheep having fleeces with pointy staples, thinly set on, and of unequal lengths—who stints his sheep of food at times, producing wool of unequal size—who does not wash his sheep clean—or, having washed them clean, allows their wool to be dirtied before being clipped, injures his clip of wool to a serious extent.

Any person, on the slightest inspection, may observe that the wool which covers a sheep consists of different qualities, the coarser being found on the lower and the

finer on the upper and more forward portions of the body. The finest wool will be perceived on the shoulders, and along the top of the back to the rump; the next best grows below the shoulders, running along the ribs to the rump; coarser still on the haunches; below the belly it is (especially amongst the coarser wooled breeds) coarse and detached, and is not classified with the other varieties.

Attention by farmers to the different classes of wool required in the various manufactures of woollen and worsted goods, would be the means of directing them to produce not only that variety of wool calculated to make the largest return at the place where they might be located, but also direct them to what market their peculiar quality was in most demand, and where it would, consequently, obtain the highest price. As a general thing, manufacturers require three kinds of wool: one for carding, another for combing, and one intermediate.

CARDING WOOL

Should be short, under four inches in length, fine, true, very elastic; when drawn out lengthways it ought to immediately retract to its original form, on withdrawing the force that drew it out.

The object of carding is to break the wool completely, to intimately blend the whole, so as to form a thin roll of a very slight texture, being merely held together by the natural serrations, which will shortly be noticed at

greater length. Wool susceptible of this treatment in a high degree, is capable of being manufactured into the finest compact fabrics, and by the aid of the shears possessed also of a smooth surface.

COMBING WOOL

Should be more than four inches long, fine, true, but little elastic; in length each pile when operated on by being submitted to the machine, should easily be drawn out into spirals. The comb has not only the effect of laying the piles straight and even, but also removes the shorter and longer piles as also the knotty kinks.

The distinction in the spinning of carding and combing wool, is thus described by Mr. Luccock: "In twisting a woolen thread when the staple has been previously broken and the fragments in the utmost disorder, they become united merely by their natural hookedness, the turning of the wheel rolls them together without arrangement, and they are placed in every possible direction. But in spinning a worsted thread, when every hair has been previously disposed at the side of others in the most regular order, the pile is drawn out in the direction of its length, every single hair being parallel to all those which lie near it, then become twisted in a spiral form, something like the threads of a compound screw. If these hairs contracted their length in any considerable degree, they could not be correctly arranged, nor drawn out in that regular order

which the work requires, but would be twisted into a thread of an irregular and crumpled form—a circumstance injurious to worsted yarn, and to the goods made from it.*

Intermediate between the short and long wool, are the varieties used chiefly in the hosiery manufacture.

The late Mr. Youatt was the first to draw attention to the serrated character of wool; he also inferred that the felting property consisted chiefly in the ratio of these serrations, the more numerous they were, the greater he inferred the felting property would be. Professor Simmonds attributes the felting quality to exist only in connexion with the number of spirals, wool being possessed of good or bad felting properties in proportion to the number of spirals existing within a given lineal space—the greater the number of curls the fitter for felting purposes. On carefully examining the matter, I am disposed to believe that in the curly character, the felting property rests more in degree than upon the number of serrations; the best fulling wool, however, unites both. It appears, however, to the writer, that either alone or combined, the properties noticed, do not account for all the phenomena and anomalies connected with felting cloth.

The comparative fineness of the pile of wool and the number of serrations, in the following breeds of sheep, were measured by Mr. Youatt, with the micrometer:

* Luccock on Wool.

	Diameter of one inch.	Serrations in the inch.
Merino Wool	1-750th	2400
Merino Picklock	1-750th	2560
Merino Saxony	1-840th	2720
Leicester	1-500th	1860
Ducan Black	1-1000th	1280
Odessa	1-750th	2080
Wallachian	1-750th	2080
Australia	1-750th	1920
New South Wales	1-750th	2080
New South Wales—Mr. W. Arthur's	1-780th	2400
Van Dieman's Land	1-750th	
Southdown	1-660th	2080
Wiltshire	1-500th	1860
Ryeland	1-750th	2420
Cheviot Hill fed	1-500th	1860
Cheviot Hill good pasture	———	1440
Norfolk	1-580th	1600
Lincoln	1-480th	1280
Irish	1-560th	1920

In the preceding table it will be seen what effect the difference of pasture has upon the character of wool, on comparing the two examples of Cheviot sheep. It may be remarked, also, that the above table was made between thirty and forty years ago ; since which the Australian varieties of wool have been greatly improved.

In no description of textile manufactures has the agency of machinery had such an equalizing effect in the value of the raw material as in those relating to wool. Early in the present century the highest priced wools were worth $1 80 per pound, whilst the commonest only obtained ten to twelve cents per pound. For some time the demand exceeded the supply of the best wool.

About forty years ago a practice commenced of cutting long wools into short lengths for the manufacture of common woolen cloths; this, with the introduction of cotton warps and the tendency of Southdown fleeces to become heavier and coarser, reduced the price of Southdown fleeces very considerably, as they had become too coarse for the carder, and not long enough for the comber. This difference in price stimulated the manufacturer to improve his combing machinery so far as to enable him to use the Southdown wool for combing purposes. This change was hastened the more from the fact that the farmer, by the greater extension of the green crop system of husbandry, which furnished him with abundance of winter food for his sheep, was gradually increasing the weight of the fleece and the length of the staple, as will be seen by the tables which will follow. At the present time Southdown varieties of wool obtain comparatively the best prices and readiest sale; Electoral wool not being worth more than sixty cents per pound, and Australian runs from twenty to thirty-six cents per pound. The commonest Buenos Ayres wool may probably be worth ten cents per pound.

The following list of prices of English wools was, I believe, drawn up for the English Board of Trade. I am not aware that the prices greatly differ at the present time. Since the preceding was written I have seen a London Prices Current of Australian and German wools, which fully corroborates the preceding estimate

of the value of those varieties, which justifies me in believing that the following rates are too low at the present moment for British wools, as, from the Bradford Circular, there appears to be a scarcity of worsted varieties:

PRICE OF ENGLISH WOOLS IN 1855.

Lincoln Wethers.—Twenty-five cents per pound; hog, 26 cents do. Very fine long wool, suitable for lustres, obtains a higher figure. This wool rises and falls according to Alpaca wool.

Leicester Wethers.—Twenty-five cents per pound; hog, 25 to 26 cents.

Cotswold Wethers.—Twenty-five cents per pound; hog, 25 to 26 cents.

Southdown.—Considerable differences exist in this variety of wool, according to the locality from which it is derived. Wool from ewes and wethers worth 26 cts.; teg do. 27 to 28 cents.

Hampshire Down.—A short wool, very similar to Southdown in general character; staple rather longer, but not quite so fine. Ewes and wethers, 26 cents; tegs, 27 cents per pound.

Norfolk Down.—The down wool grown in Norfolk is generally soft in its nature, but owing to its frequently being full of light blue sand, its value is much reduced. Some of the best and cleanest is a very rich, beautiful wool. Value of ewes and wethers, 25 cents per pound if sandy, 27 cents if clean; tegs, 27 to 28 cents.

Shropshire Downs.—Generally longer in the staple and with more lustre than other Down wools. The fleeces vary considerably, according to the original proportion of short-wooled or long-wooled blood crossed with the breed. Value of wethers, 26 to 27cents ; tegs, 27 to 28 cents per pound.

Dorset.—Rather longer in the staple and not quite so fine as the Downs, but for combing purposes quitc as valuable. Clean, white, soft wool Dorset fleeces was worth, at the period named, 26 cents per pound ; lambs' wool 32 to 36 cents. It may be remarked that it is usual in Dorset to shear the lambs—a practice, however, to be deprecated.

Ryeland.—Some of this wool found its way into the market, although described as a breed nearly extinct, and the wool as formerly used for clothing purposes, and as very fine and short, valued at 27 cents per pound, an estimate lower probably by ten per cent, in consequence of the small parcels in which it is brought to market. Should, however, the staple be lengthened, as I have no doubt but it would be if introduced into California, would form a very valuable wool, and would cross with Australia Merinos to the mutual advantage of each other.

Anglo Merino.—This wool, principally a cross of the Merino with the Hampshire Down, appears to be still known at the chief wool markets in England. The value is given for wethers 28 cents ; hogs, 30 cents per pound.

Radnor and Welsh Mountain.—In the account from which this is derived, these two are classed together, and described as a moderate combing wool, somewhat coarse and kempy, with values represented as obtaining 25 cents per pound for wether and 27 cents for teg wool. It may be remarked, however, that the above prices form no criterion as regards the value of the Radnor, Forest of Clun or Ryeland sheep, if transported to such a mild climate as California.

Cheviots.—This is a small haired wool of medium length, suitable for worsted and woolen purposes. It is a soft, rich wool, much liked by the manufacturers. In the districts where the sheep are smeared the value of the wool is considerably reduced. Value of ewe and wether wool, 25 to 26 cents per pound; of hogs, 27 to 28 cents.

Prices of Wool of Cross Breeds in 1855.

	Wethers and Ewes, Per pound.	Hogs and Tegs, Per pound.
Leicester and Southdown	25 @ — cts.	26 @ 27 cts.
Leicester and Shropshire Downs	27 @ — "	— @ 28 "
Leicester and Highland	18 @ 20 "	20 @ 22 "
Leicester and Bampton	24 @ 25 "	25 @ 26 "
Leicester and Norfolk Downs	25 @ — "	27 @ — "
Cotswold and Southdown	25 @ — "	27 @ — "
Cotswold and Shropshire Down	24 @ 25 "	27 @ — "
Lincoln and Southdown	25 @ 26 "	27 @ 28 "
Lincoln and Exmon	24 @ — "	25 @ — "
Cheviot and Southdown	25 @ 27 "	28 @ — "
Highland and Southdown	26 @ 28 "	— @ — "
Dorset and Southdown	26 @ 27 "	— @ — "
*Dorset and Lambs' wool	— @ — "	36 @ 40 "
†Merino and Romney Marsh	28 @ 29 "	30 @ — "

* The lambs are shorn in this district.

† This cross forms a very beautiful fleece, and makes an excellent combing wool, being fair, clean and rich. When warps were made of worsted it realized a high price.

Another cause has arisen for the approximation in price which has been gradually taking place during the last forty years, between fine wool and the coarser varieties, is the fact, that open woolen goods, as Tweeds, etc., have become more fashionable, and for warm climates found mnch more conducive to health. There has consequently been a far less proportionate demand over the period named for fine broadcloths, as compared with the increased amount of population and accumulation of wealth for the same length of time, to say nothing of the introduction of civilized wants into uncivilized regions; whilst on the other hand, open qualities of woolens have become and are becoming more into use daily; and as the grounds for this preference are based upon sound theoretrical data, it is fair to infer, that high priced fine wools will never again be so much in demand as they have been.

Amongst the minor uses of the very finest wool, such as extremely fine Saxony lambs' wool, is that of making the bodies for beaver or stuff hats, a manufacture which has been almost annihilated since the introdnction of silk hats. In California, however, where the hats worn are usually fine felts, or bodies, it might be supposed that the whole of those used in the State might be made here, and that from California grown wool; little capital would be required, as the *plant* for that part of the hatter's business is of an inexpensive character.

Of more importance to wool growers is the fact that already there are established at San Francisco two

woollen mills, whose agregate annual consumption of all varieties of wool approaches one million pounds; only requiring a moderate domestic patronage to double or treble their present capacity within a very brief period. The production of wool in California was estimated last year to amount to three millions of pounds, whilst the population by the census taken was much less than half a million. It is, however, generally supposed that the returns for the census were under estimates; which, together with the increase of population which has taken place since that time, renders it in the highest degree probable that the population of California, Oregon and Washington Territory is not less at the present moment than 600,000 souls, consuming on an average, in one form or other, ten pounds of wool per head, or double the total weight of last year's yield. In making this calculation, I believe I am averaging the consumption at too low a rate. Would it not be a wise economy to purchase the home-made article, even though a fractional higher price be given, by the inhabitants of this and the adjoining State and Territory, in this infant state of the growth of the raw material, as also of its manufacture. I am assured, however, by the proprietors of the works just noticed, that no extra prices are needed: that they are able, with the exception of broadcloths, to compete with the imported article.

It will no doubt be interesting to the bulk of readers, to learn a few general particulars respecting the woollen mills now at work at San Francisco, which will be

given in the chronological order of their establishment.

SAN FRANCISCO WOOLLEN FACTORY.

They consume 35,000 lbs of wool per month, purchasing qualities from the lowest to the highest; but the greatest quantity purchased is that known as American wool, from which is manufactured the kind of blankets in most general use. A very fine blanket, equal to the best I have ever seen turned out of the celebrated Rochdale blanket district, is also manufactured to a more limited extent, the price being relatively higher.

One of the most extensive objects of manufacture are miners' grey blankets, of which there are two or three varieties; one especially useful, and which, I am informed, has already established a name for its good qualities and cheapness, being known by the trade and consumers under the name of "WASHOES." They are a very serviceable, stout article, and from their color not so liable to soil when, as must oftentimes, in the majority of miners' cases, be subjected to hard usage. Others are made of various colors, as scarlet, blue, green, and of different sizes and weights.

These works make on an average one hundred pairs of blankets per day, employing in their manufacture three sets of cards, four spinning jacks of two hundred spindles each, and thirteen looms. One of the proprietors informed me, at the same time giving it as an illustration of the general dirty character of California wool, that they consumed sixty thousand gallons of water per day.

THE MISSION WOOLLEN MILLS.

Do not confine themselves to one article, though hitherto they have chiefly produced tweeds from coarse to fine; flannels, chiefly greys and blues for shirts; some blankets; and possess machinery for making carpets and the most costly tweeds—the last more expensive than superfine broadcloth. The capacity for consuming the raw material has been stated to me as equal to 400,000 lbs. per annum. Extensive additions are contemplated.

FRONTISPIECE.

By favor of Messrs. Heyniman, Peck & Co., the proprietors of the factory, the publisher has been enabled to illustrate this publication with an excellent representation of the Pioneer Woolen Mill of California, the engraving for which has been executed expressly for this work. When, as it is hoped, within only a few years, the woolen manufacture of California will more than have quadrupled its present capacity, it will probably become a matter of interest with many to possess a correct representation of this mother mill, as originally constructed. Its delineation was, therefore, considered a fitting frontispiece for a work like the present. The date of the erection is A. D. 1859.

CHAPTER VIII.

CALIFORNIA PASTURES.—Beneficial effects of the treading of Sheep—Injurious effects on Wool of burr clover—Remedies suggested—Exquisite flavor of Mutton and Venison, fed where the mountain thyme flourishes—Gregariousness of pasture grasses.

The composition of pasturage, in an economical point of view, is of equal importance with the question of breed, for on the species of food most prevalent will chiefly depend what variety of sheep will pay the best. As a usual thing, the pastures of California contain the clovers in considerable abundance and variety, interspersed throughout all the country embraced within my own observation; some kinds are known, (especially on the sandy soils,) to be of a very dwarfy character, these may improve when well stocked and trodden down by sheep, for it is a well ascertained fact that no means are so powerful in producing a thick sward as that of treading into the soil the droppings of sheep; hence the old Spanish proverb, which I have adopted as a motto to this work: "WHEREVER THE FOOT OF THE SHEEP TOUCHES THE LAND IS TURNED INTO GOLD." Although a Spanish proverb, its realization has long been known to the English light land farmer, this animal on one class of light soils, being used in place of a mechanical presser, and also to consolidate the ground, by folding them on young crops of the cereal grains, especially when the latter are over luxuriant

during their earlier growth ; thus obtaining a nice bite for which in return the more consolidated character of the soil and the subsequent superior tilling of the grain crop, consequent on their pressure, affords a more than remunerating compensation. The benefits arising from this practice of folding sheep, so prevalent in the chalk lands of England at a former period, has been always attributed to two circumstances, namely, the consolidation of the soil arising from their pressure, and the benefit of their manure ; the former is now effected in many instances by the use of the roller. It was always a debatable point whether the arable land gained more than the pasture land lost, owing to dressings, which the latter were deprived of in consequence of being withdrawn during the night, in order to void on the fallow fields a part of the nutriment obtained from the pastures during the day. When it is taken into consideration that the flocks for folding purposes were often driven three or four miles each morning and evening, perhaps the bulk of readers will agree with the author that on drawing a balance of the benefits and evils arising from the practice, the latter predominated, and would have caused it to have been abandoned earlier than it has been, had it not been fostered by the artificial assistance so long given in England to the growth of grain crops by what has been called the *protective (?)* aid of the corn-laws, now wisely abolished. The growth of green crops, the roller and seam-presser, oil cake, guano and other aids, to the ordinary fertilizers accumulated on

the farm, have more than counterbalanced any loss to the arable land arising from withholding the mechanical aid and fertilizing agency of sheep on the arable lands, to the great benefit of pasture and animals, as the loss of muscle and fat of the latter by daily traveling five, six, and sometimes eight miles per day, back and forwards between the folds and the pasture, must in the course of months, have formed a considerable item of animal waste. The practice has, however, caused the South-down to possess a distinctive trait as compared with other breeds that have been improved, namely, a capacity of traveling without injury, much beyond the Leicesters, Cotswolds, etc., and perhaps superior to the Cheviots, but inferior to the uncultivated mountain varieties; under special conditions, this may be a quality very desirable in a flock.

The greatest pest in relation to pastures which the California farmer has to encounter, is the Burr Clover, as it is commonly called. I have been at some trouble to investigate the origin and character of this plant, and find the general opinion of those who have studied the subject is that it is not an indigenous plant, but has been introduced from South America.* The specimens

* This has recalled to my recollection that about thirty years ago, when Buenos Ayres wool was introduced into England, it was greatly depreciated in value, owing to the prevalence of small burrs, rather larger than the clover burr of California. At that time these burrs were generally attributed to thistles, but were much smaller than thistle burrs or the burdock. Not having for many years had an opportunity of examining wool from the Argentine Republic, I cannot say whether any remedy has been discovered.

preserved in the Botanical Collection of the CALIFORNIA ACADEMY OF SCIENCES,* San Francisco, are described by Dr. Kellogg, under the title of "Medicago Intertexta," and "Medicago Denticulata" by Dr. Andrews. It is a species of lucerne, the burr-like character of the seed arising from the seed possessing stiff, claw-like protrusions, which, when the pod curls up as it does in three curls, forms the well-known burr. Under the existing state of California Agriculture, it is very difficult to suggest a remedy. The best which I have seen proposed is to shear the sheep before the plant seeds. This mode of obviating the evil may be easy enough in the Northern parts of California; but in the Southern counties, I expect will be much more difficult of accomplishment: because this plant will grow and mature its seeds more rapidly in the southern districts. With early autumnal rains and a mild winter, many plants in those parts would have their seeds perfected by January: in some years I have witnessed the perfect seeds growing in the vicinity of San Francisco in the month of March. When, however, the clipping of the wool can be accomplished without other injury arising therefrom before the burr is found,

* Already at this excellent institution has been made a considerable collection of California grasses, which it is very desirable should be extended to every part of the State, and especially from every variety of soil; in this way a most valuable amount of knowledge could be obtained. Mr. G. Bloomer, the able curator of the botanical department, or Col. Ransom, the Chairman, will cheerfully afford any information to such as are willing to assist in this praiseworthy object.

this course ought always to be followed. I suspect from the wool buyers of San Francisco complaining of the wool arriving from the South being more burry than that arriving from the North, that this plant does seed very early in those districts, and consequently will prevent that avoidance of the evil which in this respect the more fortunately situated farmers of the northerly counties may conveniently attain.

In a country where arable husbandry is carried out to a considerable extent, a remedy would be attempted by fallowing. This, however, is wholly unsuitable to the present state of Agriculture in California, and probably, also, for a long future. The only remedy that I can suggest is, *to crowd it out*. As far as my observations have gone with regard to the pastures of California, where this obnoxious plant is seen to be most prevalent, I have observed that the latter generally occurs where the ground is not well covered with other and more useful plants, this openness of herbage affording the burr clover a better opportunity of exercising its trailing habit; a thicker vegetation would probably check its growth. There are economical means of promoting the growth of valuable pasture plants, beyond what grow spontaneously, by sowing other plants which, from their known habits, may be anticipated to remedy the evil; amongst the grasses not indigenous to California there are, doubtless, many that would greatly aid the object desired; the want, however, of a thorough knowledge of the grasses indigenous to the State, for-

bids my passing an opinion on them. There are, however, two or three plants which might probably be adopted with advantage for obtaining the object sought, namely, such a thick growth of other pasture plants as would probably most effectually crowd out the pest. One plant is indigenous to the State ; another has a close variety, indigenous ; and the third is not, as far as I am aware, indigenous, yet from its habits, as displayed in Europe, would, doubtlessly, aid the object to be attained.

The first I shall allude to is the upright yellow melilot, often seen growing in the vicinity of the burr clover; if thickly sown, its upright character would probably greatly aid in crowding out its more diminutive congener ; at all events, it would, certainly, by its upright and overshadowing growth, greatly retard the seeding of the burr plant, and would probably prove sufficiently effectual as to avoid any injury arising therefrom until after shearing time. The next plant I shall recommend is the plantago lanceolata, or narrow-leaved plantain, commonly known amongst English farmers by the name of rib-grass ; it is a plant which sheep relish very much, has a long tap root, and would probably remain verdant the greater part, if not the whole of the year ; as the leaves spread out, it is well adapted for the office it is intended, namely, that of crowding out a less desirable occupant of the soil. A variety of the common broad-leaved plaintain is indigenous to California, and renders almost beyond a probability, that the narrow-leaved kind, if introduced, would form a valuable economical

pasture plant, independent of the advantage which may be derived by its aiding the displacement of one less desired by the sheep-owner. The last plant which I shall suggest, is the mountain, or wild thyme. On many of the light gravelly and sandy soils of England, chiefly occupied as sheep walks, sometimes as deer parks, the wild thyme is very common, and is relished by sheep and deer beyond any other plant, the mutton and venison derived from pastures where this plant prevails acquiring a flavor exquisitely fine beyond that formed on similar animals fed on ordinary pastures ; so well known is this, that mutton and venison derived from certain well known districts, obtain a higher market price, wholly attributable to being in part fed upon this plant ; as its natural habitat is a dry one, I feel pretty confident that the mountain thyme would flourish on the light dry soil of California, and materially aid in diminishing the evil effects of the scouring qualities of the early spring grass. With these aids, and that of the indigenous clovers, there are good reasons for believing that the present sparsely distributed pasture plants will become thickened, and tend to lessen the injurious consequences of, if it does not practically extirpate the burr clover. Should the means thus recommended be ever attempted, the marked effects of the sheep's GOLDEN FOOT will be at once perceived in promoting a thick sward, which once formed will be found to retain a verdant appearance much longer than the pastures as they now exist, and in many cases, probably, conduce to the growth of that gread desideratum, perennial verdancy.

Perhaps there are few things more vague, even in a farmer's estimation, than the terms grass and pasture; amongst the more observant, few are acquainted and can distinguish more than half a dozen varieties, yet the number of grasses amount to nearly two thousand, of which more than one hundred merits the special attention of farmers. Some are annual, but of the pasture grasses the bulk are perennial, and it is to the latter class that the California farmer ought more especially to direct his attention, as some flower and perfect themselves early, others late; the latter being the most economically interesting to the California flock master. An additional reason exists why the sheep owner on the North Pacific should pay a closer attention to the subject than has been done, namely, that property of gregariousness which has been observed generally amongst grasses, but especially so with some varieties, by which a particular kind of grass is found to flourish better when grown in company with other varieties, than when grown alone. It has been observed that the richest pastures in the world have been found to yield, not only the greatest number of plants to the square foot, but also those in the greatest variety; the only other plants found being the yarrow and the clovers. The flowery mead, so elegant in poetry and beautiful to the eye, is by no means favorable to the farmer's interest. Exterpation of all plants other than those desired by his stock, ought to be his endeavor; and

the author hopes the few hints he has previously given, will assist so desirable a consummation.

Amongst the plants which would probably assist in crowding out the burr clover, may be mentioned the Alfalfa clover.

CHAPTER IX.

RECAPITULATION.—Money return of fine and medium fleeced Sheep compared—Very high blooded animals perhaps not the best to breed from—Resume of varieties as adapted for different localities.

It is unnecessary to repeat at any great length many of the preceding observations respecting the unfitness of very fine wooled sheep for the existing state of California husbandry; perhaps, however, the simplest mode of making this evident, is to take as an example, two sheep—one yielding a fleece of very fine wool, worth say 50 cents per pound and weighing $2\frac{1}{2}$ pounds to the fleece, and another yielding 4 or possibly 5 pounds of wool worth 30 cents per pound, taking the less weight of the latter instance, the difference in money returns would only be 5 cents per sheep; a difference by no means adequate to compensate the extra care and attention required in order to maintain the finer fleeced animal in proper condition. For it must always be kept in view that any decadence which may take place in a valuable wool, depreciates its market value in a far greater degree than any similar interruption in the growth of wool of inferior quality; thus a faultiness in a moderately priced wool that would only depreciate its value 4 or 5 cents per pound, would in a high priced quality diminish its value 25 cents. Under all circum-

stances, the writer therefore concludes, that the breeds best calculated to repay the farmer in California, at the present period, are those which would yield fleeces on wethers of about four to six pounds, worth at the port of shipment from 25 to 35 cents per pound; to obtain them, it would not require any extraordinary high blooded and expensive animals.

At the present time, it is estimated that there are within the territorial limits on which the work chiefly treats, at least 800,000 bearing ewes, requiring the services of 40,000 males, at the lowest calculation; indeed, it is difficult to see how so few rams could be made to suffice. These numbers, without making any pretensions to exactness, will enable the reader to judge of the magnitude of the operation, if a general change is desired to speedily take place in the ordinary character of California wool. Any beneficial effects which have taken place in ameliorating the old Mexican fleece, by crossing with imported blood, have not entered into the above calculation, because, up to the present time, that element cannot amount to a very large per centage.

The question remains for California farmers to determine, whether they will improve their sheep stock by a combined energetic movement, or leave its gradual amelioration to individual effort, spread over a longer period; the first, in many ways, would be the most economical. The importation of even so small a number as 5,000 rams, in the course of one year, would probably require an aggregate capital of from $75,000 to

$100,000, and in part employ twenty-five vessels, for two hundred animals is quite enough to embark in one moderately sized ship.

Reason has already been given why a preference need not be given to very high blooded animals, such always displaying more conspicuously the effects of pinching want in inclement weather, than the varieties whose exterior form has been less cultivated. In fact, nature has put a bound to our exertions. If we desire early maturity and the putting on of flesh and fat on the exterior parts of the animal, we must to a certain extent sacrifice hardiness of constitution and fineness of wool ; if we are to preserve the two latter qualities, we must sacrifice the two first. It does not, however, appear to me that any sacrifice will be made by adopting animals that are not prone to put on flesh and fat on the exterior parts, but rather, that a gain will be obtained, for the internal fat of the slaughtered animal, according to existing appearances, is likely in future to prove the most valuable part of the sheep's carcass relatively to its weight. It cannot be too strongly impressed on the farmer's mind, that he must judge not what pays, and has paid the best in England or any other place, but that which is most likely to make the best return in California, taking into account and fully balancing the relative advantages and disadvantages of climate, soil, cultivation, etc.

The Hudson Bay Company first attempted improvements by the Australian-Merino ; this, as might have

been anticipated by any one acquainted with the subject, did not answer ; they are now trying Southdowns, a step better, certainly, but which might have been improved by importing Cheviots instead.

In fine, the conclusions I arrive at are, that the Dorsets will pay best on small farms near the large cities, where two sets of lambs per year would, to a certain extent, find a ready and profitable market.

The Leicester, although a rapidly fat and mutton-growing animal, yielding a pretty heavy fleece of marketable wool, requires good pasture in order to bring out its most favorable points in perfection, the meat, however, is very inferior, and as a whole, is, in my opinion, for California, decidedly inferior to the Southdown, which latter, for general purposes, when in contiguity to a good meat market, may possibly pay equal to any other variety.

The Lincoln and Cotswolds will be desirable animals for the tule lands when such are reclaimed.

The diminutive Purik would recompense the owner where almost any other variety would perish, amongst the snows of the Sierra Nevada. If this valuable little animal should be introduced, its skin would be valuable for making caps and warm upper clothing for the hardy and industrious miners engaged in developing the mineral resources of that elevated district.

Should my views of this sheep be adopted by any considerable number of the residents of the Nevada and Mono country, and the patent office authorities do not

see fit to procure the variety from Thibit, I have scarcely a doubt but if a proper representation of the desirability of procuring these animals was made to Queen Victoria, that Her Majesty would at once permit a few from her own flock to be draughted for the purpose of introducing them.

It is assumed that the bulk of the present run of sheep in California are chiefly of Mexican blood ; yet I doubt if an immediate cross with superior Merino varieties would be the best improvement in the first instance. I believe that a cross with the, as I consider, the older fine wooled breeds of Britain would be more effective in laying the foundation for a fine wooled race, at the same time imparting to their descendants that hardiness of constitution so desirable in any breed which may be destined to graze the pastures in California during all weathers. A good foundation thus made might then be advantageously improved upon by an admixture of the Australian Merino. Should these views be adopted, it may be well to advise such as may purpose following the advice never to put an improved ram to a ewe that has borne a lamb previously, by an inferior animal, or another variety, as it chances occasionally that the resulting offspring may disappoint the expectations of the improver. The first well known instance of the extraordinary effect produced on the subsequent progeny by prior connexion with an animal of a different class, is that which occurred in the stud of the Earl of Morton, who being desirous of obtaining a breed between the

horse and the quagga, selected a young mare of seven-eighths Arabian blood, and a fine male of the latter species. The produce was a female hybrid. The same mare had afterwards, first a filly, and then a colt, by a fine Arabian horse. They both resembled the quagga, in the dark line along the back, the stripes across the forehead, and the bar across the legs. In the filly, the mane was short, stiff, and upright, like that of the quagga ; in the colt it was long, but so stiff as to arch upwards, and hang clear of the sides of the neck. In other respects they were nearly pure Arabian blood.

Another instance is afforded by what occurred with a sow belonging to D. Giles, Esq., who had a sow of the black and white kind, which was bred from a boar of the wild breed, of a deep chestnut color ; the pigs produced by this intercourse were duly mixed, the color of the boar being in some predominant. The sow was afterwards bred from by two of Mr. Western's boars, and in both instances chestnut marks were prevalent in the latter, which in other instances had never presented any appearances of the kind.

Of the law of variation, I had once a remarkable instance with some pigs which I took from England into Ireland. I bought two very handsome Chinese sows, and put them to a pure black Neapolitan boar ; the progeny were many-colored, but chiefly a dun color, striped brown down the sides, similar to many varieties found native on the Islands of the Pacific. I only kept a black sow which very much resembled the sire, and

proved a remarkably fine animal, possessed of very acute instincts, especially that of smell; in this and many other respects much more resembling the wild, rather than the domesticated hog.

In the Appendix will be found an account of a very interesting case of the law of variation, as exemplified in the Mauchamp Merino, to which the reader's attention is particularly desired.

It was originally intended to have made some remarks upon the Shepherd dog and its training, the space has, however, in the present edition, been found too limited to do the subject justice.

Whilst this work was passing through the press I had the opportunity of remarking, that the last arrived number of the *Illustrated London News* contained a very excellent engraving of Sheep in Auvergne; the copy of a picture by M. Bonheur, brother of the celebrated Rosa Bonheur; in which the distinctive character of horn to which Mr. Patterson drew my attention, is very apparent. The notice of this circumstance affords me the opportunity of thanking Mr. P. for his kindness in allowing his copy-righted fine engraving of South-downs to embellish this work.

To such as may doubt the author's views respecting the policy of rearing *very* fine wooled sheep in California, they are respectfully referred to the article on Saxon Merino Sheep, in the Patent Office Report for 1859, and also to Letters of Charles L. Fleischmann, and his Address before the Farmer's Club, New York.

APPENDIX.

FLEECE NUMBER SIX.

Assortment.	Price in Leipzic, 1836. Per cwt. of 110 lbs reckoned in Prussian dollars.	Value and weight of of the different parts of the fleece. Half ounces.	Dollars.....	Grochen....	Pence.....
Super Electoral	180	57	2	21	11 3/8
Electoral pieces	120	7 3/4	.	6	4
Prince "	80	1	.	.	6 1/2
Secunda "	55	1/4	.	.	1 1/8
Fine yellow	80	1	.	.	6 1/2
Points	45	1/2	.	.	1 3/4
Refuse	..	1/8	.	.	..
	..	.	.	.	..
Weight and value of whole fleece	.....	67 5/8	3	5	7

FLEECE NO. 17.

A sort of Secunda	85	38 1/2	..	22	3 5/8
A sort of Tertia	75	7	..	3	6 7/8
Secunda pieces	55	30	..		3
Tertia "	45	12	..	11	7 1/2
Quarter "	40	1 1/2	..	3	4 7/8
Yellow	56	3 1/4	..	..	1 3/8
Food	48	3 1/2	..	1	11 3/4
Points	30	1 1/2	..	..	3 7/8
Matted wool	..	2	..	..	..
Refuse	..	.	..	..	..
Weight and value of whole fleece	.....	98 3/8	1	19	5 3/4

FLEECE NO. 21.

A sort of Tertia	60	12	..	4	10 7/8
A sort of Quarter	81	70	..	22	10 7/8
Tertia pieces	44	26 1/2	..	7	11 3/8
Quarter pieces	40	40	..	10	10 7/8
Yellow	40	1/2	..	..	1 3/8
Points	25	6 1/2	..	1	1 1/4
Food	33	5 1/2	..	1	2 3/4
Matted wool	..	1/4	..	..	..
Refuse	..	1/2	..	..	..
Weight and value of whole fleece	.....	161	2	1	1 5/8

The above are three selected fleeces, out of the twenty-two alluded to by Captain Stanley Carr—page 39.

THE MAUCHAMP MERINO.

A correspondent of the Mark Lane Express, describing the Agricultural Exhibition at Paris. observes, that "one of the most interesting portions of the sheep show, is that of the Mauchamp variety of Merinos, having a new kind of wool, glossy and silky similar to Mohair. This is an instance of an entirely new breed, being, as it were, created from a mere sport of nature. It was originated by Mons. J. L. Graux. In the year 1828 a Merino ewe produced a peculiar ram lamb, having a different shape from the usual Merino, and promising a long, straight, and silky character of wool. In 1830 Mr. Graux obtained by this ram one ram and one ewe, having this silky character of wool. In 1831, among the produce were four rams and one ewe, with similar fleeces; and in 1833 there were rams enough of the new sort to serve the whole flock of ewes. In each subsequent year, the lambs were of two kinds; one promising the curled elastic wool of the old Merinos, only a little longer and finer; the other like the new breed. At last the skillful breeder obtained a flock combining the fine, silky fleece, with a smaller head, broader flanks and more capacious chest; and several flocks being covered with the Mauchamp variety, have produced also the Mauchamp-Merino breed. The pure Mauchamp wool is remarkable for its qualities as a combing wool, owing to the strength, as well as the length and fineness of the fibre. It is found of great

value by the manufacturers of Cashmere shawls and similar goods, being second only to the true Cashmere fleece, in the fine flexible delicacy of fibre ; and when in combination with Cashmere wool, imparting strength and consistency. The quantity of the wool has now become as great or greater than from ordinary Merinos, while the quality obtains for it 25 per cent higher price in the French market."

This is an example for California sheep breeders to always have before them, as it is more than probable that the removal of foreign animals to a different soil, climate and herbage, will be more than usually productive amongst their descendants of this kind of variation, which, if possessed of valuable features, ought to be preserved ; if of a retrograde character, equal care ought to be taken that it shall be no further propagated.

THE ALPACA.

The employment of the hairy covering of this animal as an element in the manufacture of cloth suitable for raiments, has only a very recent date, scarcely more than thirty years. Notwithstanding which, the business of manufacturing Alpaca wool has assumed stupendous proportions, and as with cotton, the cry is still for more. They have recently been introduced into Australia, and several attempts have been made to naturalize them in England, though, from causes which it is difficult to account for, they have never made head-

way. Whilst engaged on an agricultural and mineral survey of the extensive Highland estates of the Marquis of Breadalbane, I had an opportunity of inspecting an alpaca that had been living five years on the Breadalbane property. It was then healthy, the wool fine and silky, and far superior to the bulk of that imported from Peru. The chief shepherd, Mr. Aitken, informed me that it was quite a favorite, was very docile, would eat turnips and carrots in winter from the hand, and that he suspected that if there was an error in mauagement, it was in consequence of being made rather too much a pet of. The fleeces of some old animals are said to yield twenty to thirty pounds, the probable average is possibly seven to eight pounds, worth at the port of shipment from thirty to fifty cents per pound. The Alpaca inhabits the cold, rocky elevations of the Andes, immediately adjoining the region of perpetual snow, and would doubtless easily acclimate on the cold elevations of the Sierra Nevada.

ASIATIC GOAT.

The most celebrated of these animals is the Cashmere goat ; there are, however, many others deserving of attention, such as the Angora goat, whose covering is known in commerce under the name of Mohair ; it can be, and used formerly to be extensively manufactured into fine camlets, but of late years its chief employment has been confined to making the fine brilliant *ends* of superfine broadcloth. Angora is said to export about 1,250,000 lbs. per annum of Mohair ; if it was grown

to any extent in California it would be worth at the port of shipment, on an average, from sixty to eighty cents per pound. All the species of goats yielding valuable hair require a degree of care and attention which cannot economically be afforded in a country like California, where labor is comparatively scarce, relatively, to other parts of the world which at present chiefly produce these fine textiles.

THE YAK.

An article on this animal appeared in the Patent Office report for the year 1858, at the same time recommending its introduction into the United States, with the object of placing it in the Indian Territory lying east of the Rocky Mountains, for the purpose of supplying the native races with a breed of animals susceptible of enduring the severities of the winter, but at the same time requiring at their hands some little care and attention, perhaps about as much as, under existing circumstances, they are likely to bestow on any object pertaining to husbandry. The Yak is a native of Tartary and Thibet, where they are employed as beasts of burden, being strong, sure footed, and capable of carrying a great weight. They give a large quantity of rich milk, yielding excellent butter, which is preserved in bladders, or skins, in which it keeps fresh the entire year, owing to the cold climate of the country which it inhabits. When a sufficient stock of the latter is accumulated, the owners load their cattle with this, their own produce, to the most convenient market, and forms

a considerable article of commerce throughout the country which it occupies, and a large part of Tartary.

The soft fur from the hump and shoulders is manufactured into a fine but strong cloth, which, if submitted to European or American skill, it is supposed would furnish a superior and valuable fabric. The tail of the Yak is the original Turkish distinctive mark of honor, though horses' tails are now employed to distinguish the one, two, three, or five-tailed bashaw.

The Yak might with some propriety be introduced into this work as a textile bearing animal; other reasons. however, obtained its introduction, for it appeared to the author that the Yak is admirably adapted for the mineral region east of the Sierra Nevada, and consequently, if the Patent office obtains an appropriation from Congress for its introduction, it would be well for those interested in the future welfare of the State and Territories of the North Pacific, to put in a claim for consideration in the distribution of the animals, fully equal to that of the Indians of the Rocky Mountains.

I had another object, also, in alluding to the possible introduction of the Yak, namely, that it would afford a convenient opportunity of importing some Purik sheep at the same time, particularly as they also are peculiarly well fitted to occupy the same elevated and cold winter region—in fact, are the only ovine and bovine breeds well calculated to occupy those elevated districts during the cold season.

Should the authorities of the Patent Office see fit to follow up the these hints, it is to be hoped that they

will not, as with the Tea Plants, send the animals a journey of nearly four times the requisite length, by sending them, in the first place, to the Eastern States, but direct that they be forwarded at once to California, for San Francisco is not in a direct line, more than one hundred miles from some of the elevated valleys and mountains, where they might be distributed. Of the Tea plants imported, not one has yet reached California, notwithstanding it has probably as large an area suitable to its cultivation as any State in the Union, possessing, also, the further advantage of having in the Pacific States and Territories a Chinese population one hundred-fold more than all the other States and Territories of the Union put together, and facilities for obtaining additions thereto to any extent, and in the shortest possible time if such were needed, and at the least expense.

The Tea plants sent to Washington were found mostly unfit for use, and if the animals should be forwarded in a similar manner, a very considerable number will probably perish on the voyage.

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APPENDIX.

ILLUSTRATIONS.